

Bacterial Source Tracking Analyses to Support Virginia's TMDLs

Non-Shellfish Stations

Prepared by

MapTech, Inc.

in cooperation with

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Bacterial Source Tracking Analyses to Support Virginia's TMDLs

1. INTRODUCTION

EPA's document, *Guidance for Water Quality-Based Decisions: The TMDL Process* (USEPA, 1999) states:

According to section 303(d) of the Clean Water Act and EPA water quality planning and management regulations, States are required to identify waters that do not meet or are not expected to meet water quality standards even after technology-based or other required controls are in place. The water bodies are considered water quality-limited and require TMDLs.

. . . A TMDL, or total maximum daily load, is a tool for implementing State water quality standards and is based on the relationship between pollution sources and in-stream water quality conditions. The TMDL establishes the allowable loadings or other quantifiable parameters for a water body and thereby provides the basis for States to establish water quality-based controls. These controls should provide the pollution reduction necessary for a water body to meet water quality standards.

The purpose of this project is to use bacterial source tracking (BST) to identify sources of *E. coli* to support the development of Fecal Bacteria TMDLs for impaired segments in Virginia. In fulfilling the state requirement for the development of a TMDL, a systematic process will be utilized to establish the maximum allowable Bacteria loading for each waterbody to meet the applicable standard, allocate that load among pollutant contributors, and provide a basis for taking actions needed to restore water quality. This report focused on water quality sampling conducted in non-shellfish waters. A companion document will be published later this year to report the results of water quality sampling in shellfish waters. Together, these reports reflect the fourth year of BST sampling conducted by VADEQ (2005-2006).

Bacterial Source Tracking (BST) methods can be subdivided into three basic groups: Molecular, Biochemical, and Chemical. Molecular (genotype) are typically referred to as

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"DNA fingerprinting" and are based on the unique genetic makeup of different strains, or subspecies, of fecal bacteria. Biochemical (phenotype) methods are based on an effect of an organism's genes that actively produce a biochemical substance. The type and quantity of these substances produced under various conditions is what is actually measured. Chemical methods are based on finding chemical compounds that are associated with human wastewaters, and generally are restricted to determining if sources of pollution are human or not.

Two techniques were used to determine sources of fecal bacteria for this study. Hagedorn's (Hagedorn et al., 1999) Antibiotic Resistance Analysis (ARA) technique was used because it has been demonstrated to be a reliable procedure for confirming the presence of human, livestock, wildlife and pet sources. Compared to DNA fingerprinting, biochemical profiling is much quicker, typically allows for many more isolates to be analyzed (*e.g.*, hundreds per week vs. a few dozen per week for DNA analysis), is more economical, has survived limited court testing, and has undergone rigorous peer review from the scientific community. Additionally, observation of an increased number of isolates allows for an estimate of the relative proportions of the fecal indicator (*e.g.*, *E. coli*) originating from different sources. Fluorometric analysis was also used to determine the concentration of optical brighteners. Optical brighteners are used in laundry and dishwasher detergent, as well as toilet paper. Their presence in high levels indicates the likely presence of human wastewater

2. OBJECTIVES

As described in Chapter 1, two types of BST were used in this study; a fluorometric technique was used to detect human sewage, and ARA was used to identify sources of *E. coli* as well as the relative percentage contribution from source groups (*e.g.*, livestock, wildlife, human and pets) to support the development of Fecal Bacteria TMDLs for impairments located throughout Virginia. BST results will be used to improve public awareness of the problem, improve model calibration/validation of bacteria densities, and provide a more equitable allocation of loads to source classes. Originally, fecal coliform enumerations were to be done; however, as of October 4, 2005, the client requested that fecal coliform enumerations no longer be analyzed and reported. This change is due to changes in the fecal bacteria standard and economic considerations.

The specific objectives of the project were to:

1. collect fecal samples from known sources in 10 areas, based on Hydrologic Unit Codes (HUCs),
2. use collected samples to develop a known-source library for each impairment area, and
3. perform bacterial enumerations and BST analyses on whole water samples from impaired segments, using the libraries developed for objective 2.

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3. METHODS

Hagedorn's ARA method has been extensively and successfully used by MapTech, and separates fecal sources based on patterns of antibiotic resistance in the *enterococci* or *E. coli*. For this study, *E. coli* was the indicator organism analyzed. The premise of ARA is that fecal bacteria from each source (*e.g.*, human, livestock, wildlife, and pets) will have different resistance patterns to the battery of antibiotics and concentrations used in the analysis. Hagedorn's method for *E. coli* tests each isolate on 28 different combinations of antibiotic type and concentration. Confidence in BST techniques is measured by the level of separation of isolates from known sources, represented as the percentage of isolates that are accurately separated into respective source types (*e.g.*, Average Rate of Correct Classification – ARCC). Additional analyses can be applied to test the specificity of the library. These analyses are discussed further in Section 4 of this document. The ARA method, like other methods (*e.g.*, molecular), requires the collection of source samples from feces of known sources to build a source library. In support of this study, known source samples from the four source classes were collected, analyzed, and entered into known-source libraries. Additionally, a fluorescence spectrophotometer was used to quantify the concentration of optical brighteners in each water sample.

3.1 Collection of Known Sources

Known source samples were collected in ten HUCs associated with fecal-bacteria impaired waters throughout Virginia (Figure 3.1). In HUCs where known-source samples had not previously been collected to support VADEQ's BST program (newly sampled HUCs), a total of 60 samples were collected. Watersheds within HUCs with some known source sampling completed within the past two years will require the collection and inclusion of, at minimum, 20 known source samples (160 isolates). Watersheds within HUCs with some source sampling but none within the past two years will require the collection and inclusion of, at minimum, 40 known source samples (320 isolates). Each set of source samples was distributed evenly between human, livestock, wildlife, and pets (Table 3.1). Specific species within each source category (*e.g.*, deer, raccoon, poultry, beef, etc.) that were selected to represent the sources in each region

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were identified through field observation, discussion with local stakeholders, and review of available data (*e.g.*, Virginia Agricultural Statistics). From each sample, 8 isolates were analyzed using BST to create a known-source library of 480 isolates for each newly sampled HUC, and to increase known-source libraries by 160 isolates in updated HUCs. To date, approximately 3,451 fecal samples have been collected to support VADEQ's BST program, resulting in over 25,547 isolates analyzed. In total 486 fecal samples were collected for this study, resulting in 2,915 isolates analyzed.

Table 3.1 Source samples collected for BST library development.

Source	Source Species	Number of Samples Collected in Newly Sampled HUCs	Additional Samples Collected in Updated HUCs
Human	Septic Systems, Portable Toilets, ...	15	5
Livestock	Dairy, Beef, Horse, Sheep, Broilers, Turkeys, Swine, Waste Storage Pits, ...	15	5
Wildlife	Deer, Raccoon, Muskrat, Duck, Goose, ...	15	5
Pets	Dogs & Cats	15	5
Total		60	20

3.2 Development of Known-Source Libraries

An appropriate known-source library was selected for each of the impairments to complete objective 2. A predictive model was developed from each library using logistic regression. A known-source library must be large enough to prevent an over-specified fit to the library. However, known-source responses to ARA analyses have been observed to vary geographically. The characteristics of this variance have not been well defined, so the regional libraries developed for this study were combined in a stepwise procedure and analyzed to measure the resulting specificity and the predictive accuracy of the combined libraries, as detailed in Section 4 of this document.

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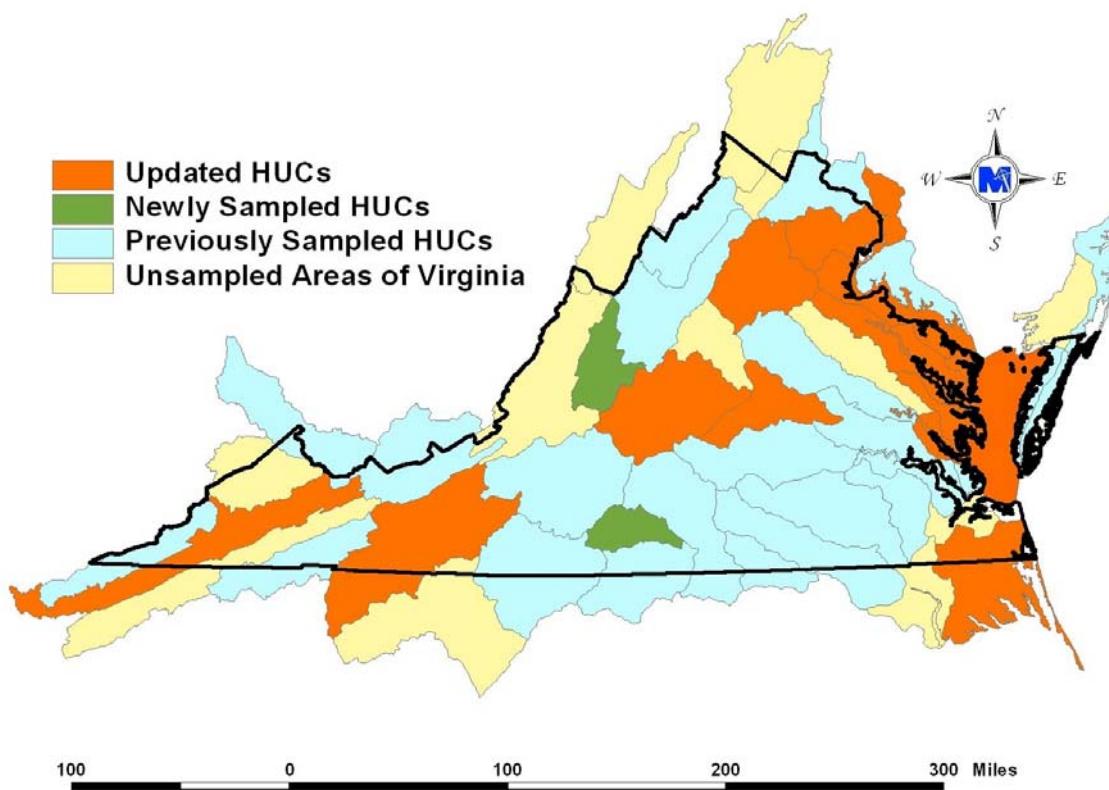


Figure 3.1 Locations of known-source sampling conducted to support this year's and previous years' BST analyses.

3.3 Bacterial Enumerations and BST Analyses

For objective 3, water quality monitoring sites were identified and sampled by the granting agency (Figure 3.2 and Table 3.2). For many sites, the contract began in July 2005. At the conclusion of the study, all sites will have been sampled as often as monthly for one year. Samples were received as whole-water samples (*i.e.*, ambient sampling as presented in Table 3.2). All water samples were analyzed for *E. coli*. BST was run on bacteria isolated from the whole-water samples. Bacteria were analyzed using Hagedorn's ARA methodology, yielding the percentage of isolates classified as human, livestock, wildlife, and pets. Up to 24 bacterial isolates were analyzed per sample, limited only by the number of isolates available from the enumeration process.

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Additionally, water samples were analyzed using a fluorescence spectrophotometer to determine the concentration of optical brighteners.

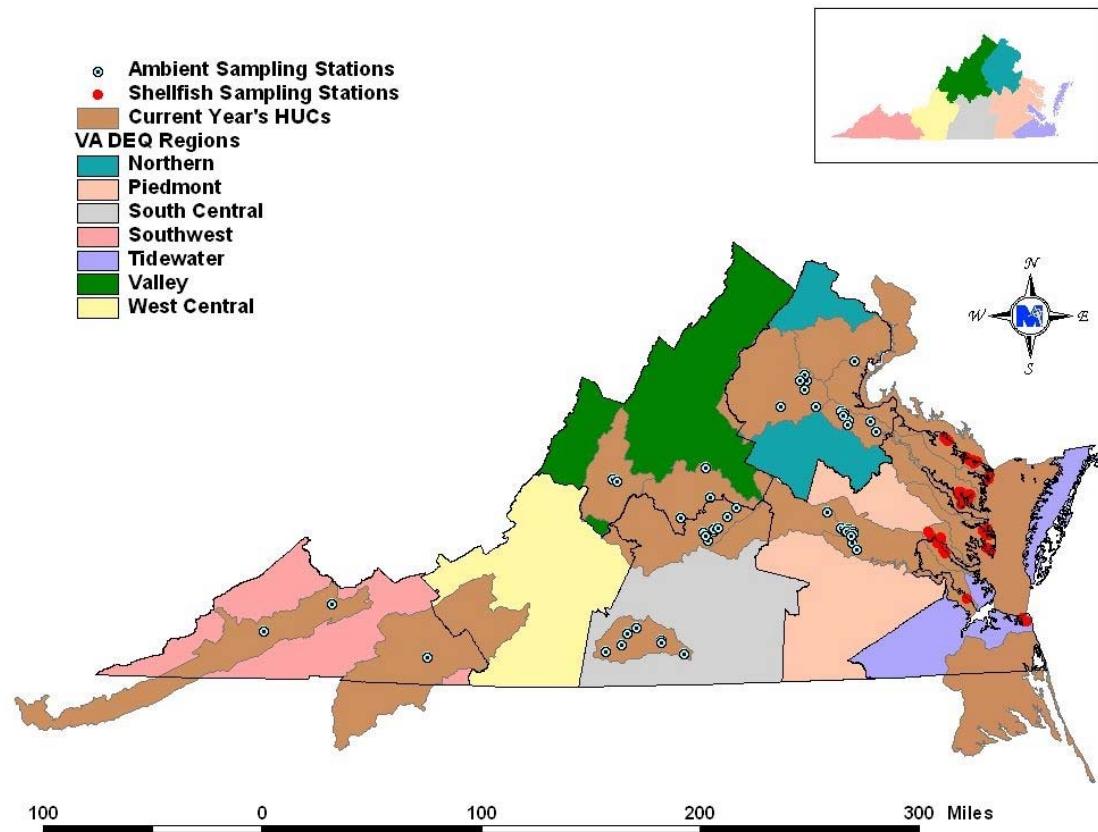


Figure 3.2 Spatial distribution of impaired segments identified by region.

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Table 3.2 Distribution of ambient sampling stations addressed in this study.

Waterbody	Hydrologic Unit	BST Stations
Indian Creek	6010205	6BIDI001.49
Lick Creek	6010205	6BLCC000.09
Hays Creek	2080202	2-HYS001.41
Ballinger Creek	2080203	2-BLR003.00
North Fork Hardware River	2080203	2HNF008.28
Rock Island Creek	2080203	2RKI003.40
Cedar Grove Branch	2080202	2CGB001.80
Slate River	2080203	2-SLT003.68
Slate River	2080203	2-SLT030.19
Slate River	2080203	2-SLT014.52
Slate River	2080203	2-SLT036.92
Austin Creek	2080203	2-AUS001.12
Frisby Branch	2080203	2-FRY000.35
North River	2080203	2-NTH001.65
Sharps Creek	2080203	2-SHR004.96
Troublesome Creek	2080203	2-TBM000.80
Turpin Creek	2080203	2-TPN003.59
Banister River	3010105	4ABAN070.20
Banister River	3010105	4ABAN023.28
Banister River	3010105	4ABAN005.58
Cherrystone Creek	3010105	4ACRR000.80
Whitehorn Creek	3010105	4AWRN005.50
Stinking River	3010105	4ASNE005.30
Sandy Creek	3010105	4ASNA000.20
Neabsco Creek	2070010	1ANE002.89
Marsh Run	2080103	3-MAH000.19
Browns Run	2080103	3-BOS000.72
Craig Run	2080103	3-CRA000.46
Rappahannock River	2080103	3-RPP147.10
Cedar Run	2080103	3-CED000.59
Rapidan River	2080103	3-RAP006.53
Rappahannock	2080104	3-RPP110.57
Rappahannock	2080104	3-RPP104.47
Rappahannock	2080104	3-RPP080.19
Rappahannock	2080104	3-RPP091.55
Claiborne Run	2080104	3-CLB000.50
Hazel Run	2080104	3-HAL000.57
Massaponax Creek	2080104	3-MAP002.61
James River	2080205	2-JMS115.29
James River	2080205	2-JMS112.79
James River	2080205	2-JMS112.33
James River	2080205	2-JMS111.47
James River	2080205	2-JMS111.17
James River CSO	2080205	2-RDD000.19
Tidal James River	2080206	2-JMS104.16
Tidal James River	2080206	2-JMS099.30
Gillies Creek	2080206	2-GIL001.00
Almond Creek	2080206	2-ALM000.42
Goode Creek	2080206	2-GOD000.77
Chestnut Creek	5050001	9CST002.64
Chestnut Creek	5050001	9CST016.82

4. KNOWN-SOURCE LIBRARY DEVELOPMENT

As discussed in Section 3, a predictive model was developed from each library (HUC) using logistic regression. Where a previously developed library existed (*i.e.*, updated HUCs), this year's data was combined with the existing data and the updated library was used for further assessment. These regional libraries were combined in a stepwise procedure and analyzed to measure the resulting specificity and the predictive accuracy of the combined libraries. The specificity and predictive accuracy were assessed through three analyses. First, the ARCC was calculated for the library. Second, a randomization test was performed by randomly assigning source categories to samples and assessing the ARCC for the randomized library. Twenty-five randomizations were performed and the results averaged. The expected result of randomization of four source categories is an ARCC of 25%, indicating a completely random result. Greater values for the randomized ARCC indicate a more specified model. Third, a jackknifing routine was conducted, where data from each whole fecal sample were individually withheld during development of the statistical model. The model was then tested for predictive accuracy on the withheld sample. In combining regional libraries, a balance was sought between minimizing the randomized ARCC and maximizing the jackknifed ARCC. Table 4.1 shows the resulting analyses on the finalized libraries, and how the libraries were applied to the analysis of whole-water samples by the HUC in which they were sampled.

Table 4.1 Results of known-source library development.

Known- Source Library	ARCC (%)	Randomized ARCC (%)	Jackknifed ARCC (%)
02080103	76.18%	44.15%	61.10%
02070010	72.38%	45.24%	51.89%
02080104	69.57%	46.11%	53.78%
02080203	75.32%	36.91%	71.07%
02080205	73.23%	39.02%	62.62%
02080206	70.37%	39.58%	59.98%
02080202	67.47%	34.80%	61.83%
03010105	65.35%	35.53%	58.31%
06010205	74.01%	42.47%	59.88%
05050001	82.37%	47.45%	70.98%

5. RESULTS

The results of the water quality analyses for VADEQ's 2005-2006 BST sampling in non-shellfish waters are reported in this section. Fecal coliform enumerations, *E. coli* enumerations, and the results of the BST analyses are reported. Originally, fecal coliform enumerations were to be done; however, as of October 4, 2005, the client requested that fecal coliform enumerations no longer be analyzed and reported. The *E. coli* enumerations are reported with the BST results to give an indication of the bacteria concentration at the time of sampling.

The bacteria source proportions reported are formatted to indicate statistical significance (*i.e.*, **BOLD** numbers indicate a statistically significant result). The statistical significance was determined through two tests. The first was based on the sample size. A z-test was used to determine if the proportion was significantly different from zero (alpha = 0.10). During the second test, the rate of false positives was calculated for each source category in each library, and a proportion was not considered significantly different from zero unless it was greater than the false-positive rate plus three standard deviations.

Optical brighteners concentrations (fluorometry results) are reported with the bacteria enumerations. As a rule of thumb, less than 50 ppb signifies little or no indication of human wastewater contamination. Between 50 ppb and 100 ppb signifies a potential for human wastewater contamination, which should be investigated if there is corroborating evidence (*e.g.*, high human proportions, aging infrastructure, or anecdotal evidence of illicit discharges). Over 100 ppb signifies likely contamination from human waste streams.

Bacterial Source Tracking Analyses to Support Virginia's TMDLs

5.1 Results for Southwest Region

The results of the water quality analyses for VADEQ's Southwest Region (Figure 5.1) are reported in the following tables. Table 5.1 indicates the number of samples analyzed in the 2005-2006 sampling phase. Bacteria enumerations and optical brighteners concentrations are reported in Table 5.2 and Table 5.5. The results of the BST analysis are reported in Tables 5.6 and 5.9.

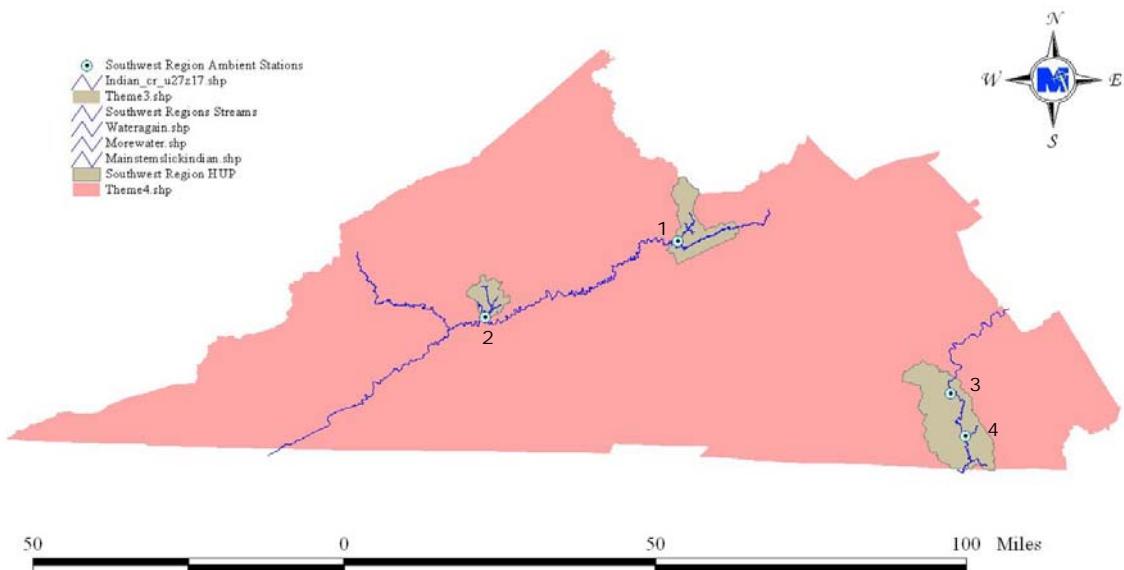


Figure 5.1 Bacterial sampling stations in VADEQ's Southwest Region.

Table 5.1 Summary of bacterial sampling in VADEQ's Southwest Region.

Station Number	Station ID	HUP	County / City	Stream Name	# of Samples Received	% Violations for <i>E. Coli</i>
1	6BIDI001.49	P02	Tazewell	Indian Creek	12	25%
2	6BLCC000.09	P10	Russell	Lick Creek	12	42%
3	9CST002.64	N06	Carroll	Chestnut Creek	9	22%
4	9CST016.82	N06	Carroll	Chestnut Creek	9	33%

Table 5.2 Bacterial Enumeration for Indian Creek at Station 6BIDI001.49.

Station ID	Date of Sample	Lab ID	Lab-In Date	E. coli cfu/100 ml	Quality	Fecal Coliform cfu/100ml	Quality	Optical Brighteners /PPB	Comments	Lab-Out Date	Lab Personnel
6BIDI001.49	9/14/2005	D4768	9/15/2005	74		290		48.00		9/17/2005	DMT
6BIDI001.49	10/24/2005	D4907	10/25/2005	210	A			57.00		10/28/2005	DMT
6BIDI001.49	11/1/2005	D4933	11/2/2005	78				55.40		11/7/2005	DMT
6BIDI001.49	12/7/2005	D5029	12/8/2005	205	A			50.90		12/14/2005	DMT
6BIDI001.49	1/23/2006	D5225	1/24/2006	254	A			56.90		1/27/2006	DMT
6BIDI001.49	2/13/2006	D5320	2/14/2006	6	B			33.10		2/20/2006	DMT
6BIDI001.49	3/7/2006	D5449	3/8/2006	10	B			36.50		3/13/2006	DMT
6BIDI001.49	4/24/2006	D5718	4/25/2006	207	A			35.30		4/26/2006	DMT
6BIDI001.49	5/22/2006	D5849	5/23/2006	180	B			34.3		5/31/2006	MAF
6BIDI001.49	6/27/06	D6053	6/28/06	200,000				64.8		6/30/06	MAF
6BIDI001.49	7/25/2006	D6162	7/26/2006	150				101.4		7/28/2006	MAF
6BIDI001.49	8/21/2006	D6288	8/22/06	670				65.9		8/24/2006	MAF

A: Value reported is the mean of two or more determinations.

B: Results based upon colony counts outside the acceptable range

U: Material was analyzed for, but not detected. Value stored is the limit of detection for the process in use.

Originally, fecal coliform enumerations were to be done; however, as of October 4, 2005, the client requested that fecal coliform enumerations no longer be analyzed and reported.

Table 5.3 Bacterial Enumeration for Lick Creek at Station 6BLCC000.09.

Station ID	Date of Sample	Lab ID	Lab-In Date	E. coli cfu/100 ml	Quality	Fecal Coliform cfu/100ml	Quality	Optical Brighteners /PPB	Comments	Lab-Out Date	Lab Personnel
6BLCC000.09	9/14/2005	D4767	9/15/2005	165	A	280		41.70		9/17/2005	DMT
6BLCC000.09	10/24/2005	D4906	10/25/2005	162	A			56.20		10/28/2005	DMT
6BLCC000.09	11/1/2005	D4934	11/2/2005	140	A			51.40		11/7/2005	DMT
6BLCC000.09	12/7/2005	D5028	12/8/2005	154	A			81.60		12/14/2005	DMT
6BLCC000.09	1/23/2006	D5224	1/24/2006	201	A			55.40		1/27/2006	DMT
6BLCC000.09	2/13/2006	D5319	2/14/2006	76				63.10		2/20/2006	DMT
6BLCC000.09	3/7/2006	D5448	3/8/2006	90				57.70		3/13/2006	DMT
6BLCC000.09	4/24/2006	D5717	4/25/2006	270	A			39.00		4/26/2006	DMT
6BLCC000.09	5/22/2006	D5848	5/23/2006	1,280	B			41		5/31/2006	MAF
6BLCC000.09	6/27/06	D6052	6/28/06	1,480	B			66		6/30/06	MAF
6BLCC000.09	7/25/2006	D6161	7/26/2006	250				45.4		7/28/2006	MAF
6BLCC000.09	8/21/2006	D6287	8/22/2006	1,110	B			66.2		8/24/2006	MAF

A: Value reported is the mean of two or more determinations.

B: Results based upon colony counts outside the acceptable range

U: Material was analyzed for, but not detected. Value stored is the limit of detection for the process in use.

Originally, fecal coliform enumerations were to be done; however, as of October 4, 2005, the client requested that fecal coliform enumerations no longer be analyzed and reported.

Table 5.4 Bacterial Enumeration for Chestnut Creek at Station 9CST002.64.

Station ID	Date of Sample	Lab ID	Lab-In Date	E. coli cfu/100 ml	Quality	Fecal Coliform cfu/100ml	Quality	Optical Brighteners /PPB	Comments	Lab-Out Date	Lab Personnel
9CST002.64	3/21/2005	D4216	3/22/2005	2	U	10	U			3/24/2005	DM
9CST002.64	4/26/2005	D4328	4/27/2005	60		70	B			4/29/2005	DM
9CST002.64	5/18/2005	D4389	5/19/2005	44		60	B			5/23/2005	DM
9CST002.64	6/6/2005	D4452	6/7/2005	64		140	B			6/11/2005	DM
9CST002.64	7/13/2005	D4535	7/14/2005	372	A	520				7/22/2005	DM
9CST002.64	8/2/2005	D4636	8/3/2005	102		120	B	36		8/5/2005	DMT
9CST002.64	9/6/2005	D4739	9/7/2005	36	B	120	B	24.6		9/9/2005	DMT
9CST002.64	10/17/2005	D4855	10/18/2005	66				27.5		10/24/2005	DMT
9CST002.64	11/28/2005	D5008	11/29/2005	66				35.4		12/1/2005	DMT

A: Value reported is the mean of two or more determinations.

B: Results based upon colony counts outside the acceptable range

U: Material was analyzed for, but not detected. Value stored is the limit of detection for the process in use.

Originally, fecal coliform enumerations were to be done; however, as of October 4, 2005, the client requested that fecal coliform enumerations no longer be analyzed and reported.

Table 5.5 Bacterial Enumeration for Chestnut Creek at Station 9CST016.82.

Station ID	Date of Sample	Lab ID	Lab-In Date	E. coli cfu/100 ml	Quality	Fecal Coliform cfu/100ml	Quality	Optical Brighteners /PPB	Comments	Lab-Out Date	Lab Personnel
9CST016.82	3/21/2005	D4217	3/22/2005	6		10	U			3/24/2005	DM
9CST016.82	4/26/2005	D4329	4/27/2005	56		50	B			4/29/2005	DM
9CST016.82	5/18/2005	D4390	5/19/2005	92		80	B			5/23/2005	DM
9CST016.82	6/6/2005	D4453	6/7/2005	230	A	190	B			6/11/2005	DM
9CST016.82	7/13/2005	D4534	7/14/2005	620		510		71		7/22/2005	DM
9CST016.82	8/2/2005	D4635	8/3/2005	184	A	260		60.1		8/5/2005	DMT
9CST016.82	9/6/2005	D4738	9/7/2005	78		350				9/9/2005	DMT
9CST016.82	10/17/2005	D4854	10/18/2005	159	A			25.2		10/24/2005	DMT
9CST016.82	11/28/2005	D5007	11/29/2005	178	A			30.6		12/1/2005	DMT

A: Value reported is the mean of two or more determinations.

B: Results based upon colony counts outside the acceptable range

U: Material was analyzed for, but not detected. Value stored is the limit of detection for the process in use.

Originally, fecal coliform enumerations were to be done; however, as of October 4, 2005, the client requested that fecal coliform enumerations no longer be analyzed and reported.

Table 5.6 Bacterial Source Tracking for Indian Creek at Station 6BIDI001.49.

VADEQ ID	Date of Sample	Lab ID	HUP ID	Number of Isolates	E. coli (cfu/100 ml)	Wildlife	Human	Livestock	Pet
6BIDI001.49	9/14/05	D4768	P02	24	74	75%	0%	0%	25%
6BIDI001.49	10/24/05	D4907	P02	24	210	4%	71%	4%	21%
6BIDI001.49	11/1/05	D4933	P02	24	78	17%	4%	46%	33%
6BIDI001.49	12/7/05	D5029	P02	24	205	0%	8%	84%	8%
6BIDI001.49	1/23/06	D5225	P02	24	254	0%	17%	12%	71%
6BIDI001.49	2/13/06	D5320	P02	1	6	0%	0%	100%	0%
6BIDI001.49	3/7/06	D5449	P02	*NVI	10	*NVI	*NVI	*NVI	*NVI
6BIDI001.49	4/24/06	D5718	P02	23	207	9%	26%	56%	9%
6BIDI001.49	5/22/06	D5849	P02	16	180	6%	6%	57%	31%
6BIDI001.49	6/27/06	D6053	P02	7	200,000	71%	0%	0%	29%
6BIDI001.49	7/25/06	D6162	P02	24	150	8%	12%	51%	29%
6BIDI001.49	8/21/06	D6288	P02	24	670	34%	29%	12%	25%

BOLD type indicates a statistically significant value.

*NVI - No Viable isolates

Table 5.7 Bacterial Source Tracking for Lick Creek at Station 6BLCC000.09.

VADEQ ID	Date of Sample	Lab ID	HUP ID	Number of Isolates	E. coli (cfu/100 ml)	Wildlife	Human	Livestock	Pet
6BLCC000.09	9/14/05	D4767	P10	24	165	46%	17%	12%	25%
6BLCC000.09	10/24/05	D4906	P10	22	162	9%	27%	50%	14%
6BLCC000.09	11/1/05	D4934	P10	24	140	25%	0%	50%	25%
6BLCC000.09	12/7/05	D5028	P10	23	154	9%	30%	44%	17%
6BLCC000.09	1/23/06	D5224	P10	23	201	13%	35%	17%	35%
6BLCC000.09	2/13/06	D5319	P10	16	76	19%	0%	56%	25%
6BLCC000.09	3/7/06	D5448	P10	12	90	1%	33%	33%	33%
6BLCC000.09	4/24/06	D5717	P10	23	270	13%	26%	35%	26%
6BLCC000.09	5/22/06	D5848	P10	15	1,280	0%	13%	54%	33%
6BLCC000.09	6/27/06	D6052	P10	22	1,480	81%	5%	0%	14%
6BLCC000.09	7/25/06	D6161	P10	24	250	8%	8%	38%	46%
6BLCC000.09	8/21/06	D6287	P10	24	1,110	17%	29%	25%	29%

BOLD type indicates a statistically significant value.

*NVI - No Viable isolates

Table 5.8 Bacterial Source Tracking for Chestnut Creek at Station 9CST002.64.

VADEQ ID	Date of Sample	Lab ID	HUP ID	Number of Isolates	E. coli (cfu/100 ml)	Wildlife	Human	Livestock	Pet
9-CST002.64	3/21/2005	D4216	N06	0	2	*NVI	*NVI	*NVI	*NVI
9-CST002.64	4/26/2005	D4328	N06	23	60	9%	39%	35%	17%
9-CST002.64	5/18/2005	D4389	N06	24	44	25%	71%	4%	0%
9-CST002.64	6/6/2005	D4452	N06	24	64	55%	8%	4%	33%
9-CST002.64	7/13/2005	D4535	N06	24	372	8%	71%	0%	21%
9-CST002.64	8/2/2005	D4636	N06	24	102	46%	21%	0%	33%
9-CST002.64	9/6/2005	D4739	N06	20	36	35%	25%	15%	25%
9-CST002.64	10/17/2005	D4855	N06	23	66	22%	52%	26%	0%
9-CST002.64	11/28/2005	D5008	N06	22	66	18%	5%	23%	54%

BOLD type indicates a statistically significant value.

*NVI - No Viable isolates

Table 5.9 Bacterial Source Tracking for Chestnut Creek at Station 9CST016.82.

VADEQ ID	Date of Sample	Lab ID	HUP ID	Number of Isolates	E. coli (cfu/100 ml)	Wildlife	Human	Livestock	Pet
9-CST016.82	3/21/2005	D4217	N06	3	6	0%	33%	0%	67%
9-CST016.82	4/26/2005	D4329	N06	24	56	25%	29%	46%	0%
9-CST016.82	5/18/2005	D4390	N06	24	92	42%	4%	42%	12%
9-CST016.82	6/6/2005	D4453	N06	24	230	92%	0%	4%	4%
9-CST016.82	7/13/2005	D4534	N06	24	620	8%	67%	0%	25%
9-CST016.82	8/2/2005	D4635	N06	24	184	55%	4%	8%	33%
9-CST016.82	9/6/2005	D4738	N06	24	78	33%	55%	0%	12%
9-CST016.82	10/17/2005	D4854	N06	23	159	13%	65%	22%	0%
9-CST016.82	11/28/2005	D5007	N06	24	178	33%	8%	42%	17%

BOLD type indicates a statistically significant value.

*NVI - No Viable isolates

5.2 Results for Valley Region

The results of the water quality analyses for VADEQ's Valley Region (Figure 5.2) are reported in the following tables. Table 5.10 indicates the number of samples analyzed in the 2005-2006 sampling phase. Bacteria enumerations and optical brighteners concentrations are reported in Tables 5.11 through 5.15. The results of the BST analysis are reported in Tables 5.16 through 5.20.

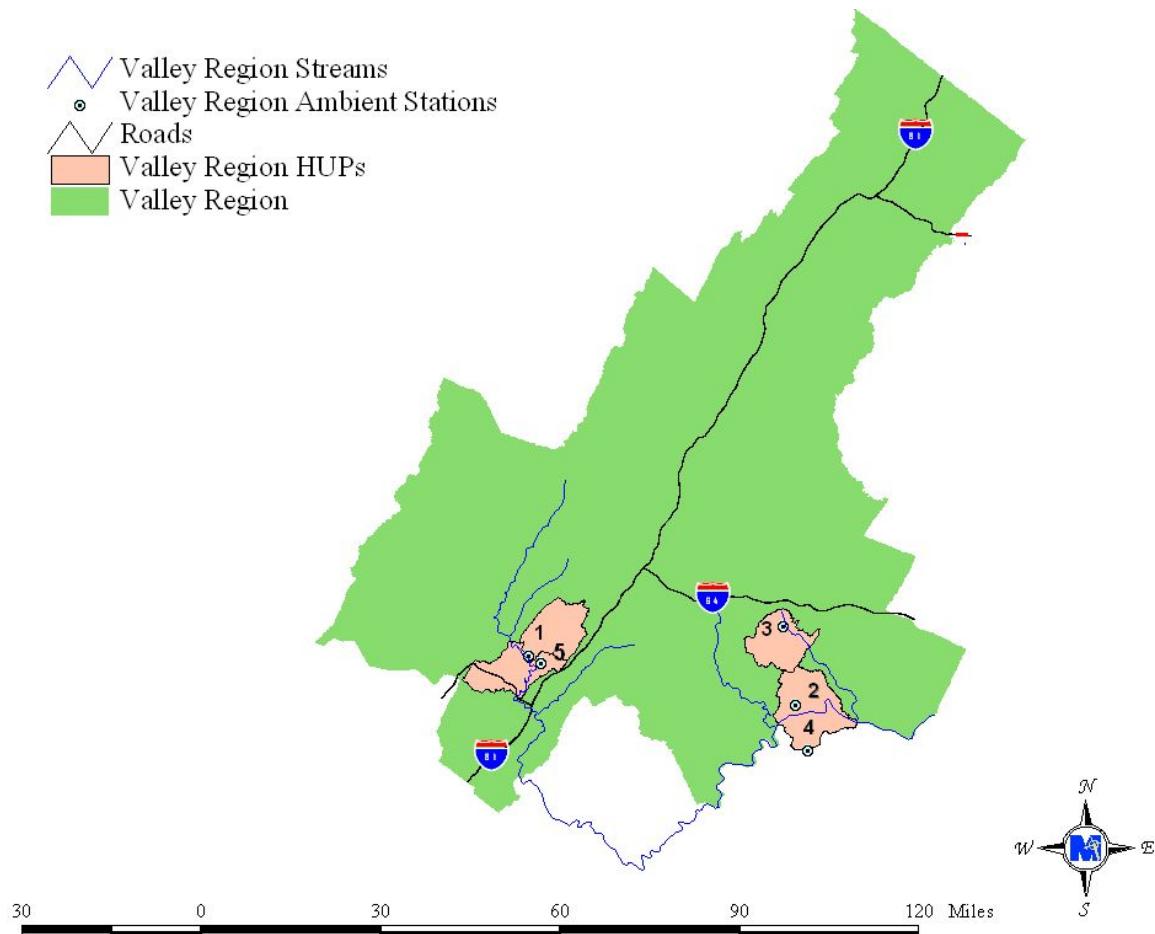


Figure 5.2 Bacterial sampling stations in VADEQ's Valley Region.

Table 5.10 Summary of bacterial sampling in VADEQ's Valley Region.

Station Number	Station ID	HUP	County / City	Stream Name	# of Samples Received	% Violations for <i>E. Coli</i>
1	2-HYS001.41	I34	Rockbridge	Hays Creek	12	42%
2	2-BLR003.00	H17	Albermarle	Ballinger Creek	12	25%
3	2-HNF008.28	H18	Albermarle	North Fork Hardware River	12	50%
4	2-RKI003.40	H17	Buckingham	Rock Island Creek	12	8%
5	2-CGB001.80	I33	Rockbridge	Cedar Grove Branch	12	58%

Table 5.11 Bacterial Enumeration for Hays Creek at Station 2-HYS001.41.

Station ID	Date of Sample	Lab ID	Lab-In Date	E. coli cfu/100ml	Quality	Fecal Coliform cfu/100ml	Quality	Optical Brighteners /ppb	Comments	Lab-Out Date	Lab Personnel
2-HYS001.41	7/11/2005	D4528	7/12/2005	365	A	530		31.40		7/22/2005	DM
2-HYS001.41	8/22/2005	D4670	8/23/2005	186	A	280		35.80		8/26/2005	DMT
2-HYS001.41	9/12/2005	D4761	9/13/2005	237	A	510		22.50		9/14/2005	DMT
2-HYS001.41	10/18/2005	D4869	10/19/2005	170	A			46.40		10/24/2005	DMT
2-HYS001.41	11/14/2005	D4942	11/15/2005	76				39.30		11/16/2005	DMT
2-HYS001.41	12/12/2005	D5035	12/13/2005	96				33.20		12/16/2005	DMT
2-HYS001.41	1/23/2006	D5218	1/24/2006	208	A			137.10		1/27/2006	DMT
2-HYS001.41	2/21/2006	D5386	2/22/2006	38	B			28.40		2/24/2006	DMT
2-HYS001.41	3/14/2006	D5489	3/15/2006	280				36.50		3/18/2006	DMT
2-HYS001.41	4/10/2006	D5625	4/11/2006	86				87.30		4/12/2006	DMT
2-HYS001.41	5/16/2006	D5796	5/17/2006	350				119.1		5/19/2006	DMT
2-HYS001.41	6/12/2006	D5939	6/13/2006	980	B			158.5		6/16/2006	MAF

A: Value reported is the mean of two or more determinations.

B: Results based upon colony counts outside the acceptable range

U: Material was analyzed for, but not detected. Value stored is the limit of detection for the process in use.

Originally, fecal coliform enumerations were to be done; however, as of October 4, 2005, the client requested that fecal coliform enumerations no longer be analyzed and reported.

Table 5.12 Bacterial Enumeration for Ballinger Creek at Station 2-BLR003.00.

Station ID	Date of Sample	Lab ID	Lab-In Date	E. coli cfu/100ml	Quality	Fecal Coliform cfu/100ml	Quality	Optical Brighteners /ppb	Comments	Lab-Out Date	Lab Personnel
2-BLR003.00	7/11/2005	D4530	7/12/2005	378	A	500		33.80		7/22/2005	DM
2-BLR003.00	8/22/2005	D4672	8/23/2005	206	A	360		45.90		8/26/2005	DMT
2-BLR003.00	9/12/2005	D4763	9/13/2005	221	A	390		32.90		9/14/2005	DMT
2-BLR003.00	10/18/2005	D4871	10/19/2005	76				53.70		10/24/2005	DMT
2-BLR003.00	11/14/2005	D4944	11/15/2005	151	A			40.50		11/16/2005	DMT
2-BLR003.00	12/12/2005	D5037	12/13/2005	84				35.70		12/16/2005	DMT
2-BLR003.00	1/23/2006	D5220	1/24/2006	106				86.70		1/27/2006	DMT
2-BLR003.00	2/21/2006	D5388	2/22/2006	96				45.60		2/24/2006	DMT
2-BLR003.00	3/14/2006	D5491	3/15/2006	156				35.30		3/18/2006	DMT
2-BLR003.00	4/10/2006	D5627	4/11/2006	96				72.40		4/12/2006	DMT
2-BLR003.00	5/16/2006	D5798	5/17/2006	320	L			92.2		5/19/2006	DMT
2-BLR003.00	6/12/2006	D5941	6/13/2006	200,000				55.7		6/16/2006	MAF

A: Value reported is the mean of two or more determinations.

B: Results based upon colony counts outside the acceptable range

U: Material was analyzed for, but not detected. Value stored is the limit of detection for the process in use.

Originally, fecal coliform enumerations were to be done; however, as of October 4, 2005, the client requested that fecal coliform enumerations no longer be analyzed and reported.

Table 5.13 Bacterial Enumeration for North Fork Hardware River at Station 2-HNF008.28.

Station ID	Date of Sample	Lab ID	Lab-In Date	E. coli cfu/100ml	Quality	Fecal Coliform cfu/100ml	Quality	Optical Brighteners /ppb	Comments	Lab-Out Date	Lab Personnel
2-HNF008.28	7/11/2005	D4529	7/12/2005	337	A	270		16.40		7/22/2005	DM
2-HNF008.28	8/22/2005	D4671	8/23/2005	353	A	1790	A	23.20		8/26/2005	DMT
2-HNF008.28	9/12/2005	D4762	9/13/2005	318	A	1365	A	15.20		9/14/2005	DMT
2-HNF008.28	10/18/2005	D4870	10/19/2005	357	A			20.10		10/24/2005	DMT
2-HNF008.28	11/14/2005	D4943	11/15/2005	80				33.70		11/16/2005	DMT
2-HNF008.28	12/12/2005	D5036	12/13/2005	68				31.30		12/16/2005	DMT
2-HNF008.28	1/23/2006	D5219	1/24/2006	78				39.70		1/27/2006	DMT
2-HNF008.28	2/21/2006	D5387	2/22/2006	12	B			54.60		2/24/2006	DMT
2-HNF008.28	3/14/2006	D5490	3/15/2006	88				26.10		3/18/2006	DMT
2-HNF008.28	4/10/2006	D5626	4/11/2006	46				114.50		4/12/2006	DMT
2-HNF008.28	5/16/2006	D5797	5/17/2006	290	L			48.3		5/19/2006	DMT
2-HNF008.28	6/12/2006	D5940	6/13/2006	200,000				60.3		6/16/2006	MAF

A: Value reported is the mean of two or more determinations.

B: Results based upon colony counts outside the acceptable range

U: Material was analyzed for, but not detected. Value stored is the limit of detection for the process in use

Originally, fecal coliform enumerations were to be done; however, as of October 4, 2005, the client requested that fecal coliform enumerations no longer be analyzed and reported.

Table 5.14 Bacterial Enumeration for Rock Island Creek at Station 2-RKI003.40.

Station ID	Date of Sample	Lab ID	Lab-In Date	E. coli cfu/100ml	Quality	Fecal Coliform cfu/100ml	Quality	Optical Brighteners /ppb	Comments	Lab-Out Date	Lab Personnel
2-RKI003.40	7/11/2005	D4531	7/13/2005	72		180	B	44.00		7/22/2005	DM
2-RKI003.40	8/22/2005	D4673	8/23/2005	40		70	B	48.40		8/26/2005	DMT
2-RKI003.40	9/12/2005	D4764	9/13/2005	18	B	310		32.30		9/14/2005	DMT
2-RKI003.40	10/18/2005	D4872	10/19/2005	149	A			58.60		10/24/2005	DMT
2-RKI003.40	11/14/2005	D4945	11/15/2005	58				50.70		11/16/2005	DMT
2-RKI003.40	12/12/2005	D5038	12/13/2005	56				53.80		12/16/2005	DMT
2-RKI003.40	1/23/2006	D5221	1/24/2006	56				105.30		1/27/2006	DMT
2-RKI003.40	2/21/2006	D5389	2/22/2006	12	B			32.00		2/24/2006	DMT
2-RKI003.40	3/14/2006	D5492	3/15/2006	20	B			40.40		3/18/2006	DMT
2-RKI003.40	4/10/2006	D5628	4/11/2006	6	B			114.90		4/12/2006	DMT
2-RKI003.40	5/16/2006	D5799	5/17/2006	90				62.2		5/19/2006	DMT
2-RKI003.40	6/12/2006	D5942	6/13/2006	1,480	B			70.9		6/16/2006	MAF

A: Value reported is the mean of two or more determinations.

B: Results based upon colony counts outside the acceptable range

U: Material was analyzed for, but not detected. Value stored is the limit of detection for the process in use.

Originally, fecal coliform enumerations were to be done; however, as of October 4, 2005, the client requested that fecal coliform enumerations no longer be analyzed and reported.

Table 5.15 Bacterial Enumeration for Cedar Grove Branch at Station 2-CGB001.80.

Station ID	Date of Sample	Lab ID	Lab-In Date	E. coli cfu/100ml	Quality	Fecal Coliform cfu/100ml	Quality	Optical Brighteners /ppb	Comments	Lab-Out Date	Lab Personnel
2-CGB001.80	7/11/2005	D4527	7/12/2005	281	A	520		33.50		7/22/2005	DM
2-CGB001.80	8/22/2005	D4669	8/23/2005	259	A	440		56.40		8/26/2005	DMT
2-CGB001.80	9/12/2005	D4760	9/13/2005	239	A	420		Empty		9/14/2005	DMT
2-CGB001.80	10/18/2005	D4868	10/19/2005	182	A			45.30		10/24/2005	DMT
2-CGB001.80	11/14/2005	D4941	11/15/2005	78				43.10		11/16/2005	DMT
2-CGB001.80	12/12/2005	D5034	12/13/2005	282	A			41.80		12/16/2005	DMT
2-CGB001.80	1/23/2006	D5217	1/24/2006	279	A			42.80		1/27/2006	DMT
2-CGB001.80	2/21/2006	D5385	2/22/2006	173	B			39.50		2/24/2006	DMT
2-CGB001.80	3/14/2006	D5488	3/15/2006	410				42.30		3/18/2006	DMT
2-CGB001.80	4/10/2006	D5624	4/11/2006	161	A			37.30		4/12/2006	DMT
2-CGB001.80	5/16/2006	D5795	5/17/2006	230	L			43.4		5/19/2006	DMT
2-CGB001.80	6/12/2006	D5938	6/13/2006	200,000				112.7		6/16/2006	MAF

A: Value reported is the mean of two or more determinations.

B: Results based upon colony counts outside the acceptable range

U: Material was analyzed for, but not detected. Value stored is the limit of detection for the process in use.

Originally, fecal coliform enumerations were to be done; however, as of October 4, 2005, the client requested that fecal coliform enumerations no longer be analyzed and reported.

Table 5.16 Bacterial Source Tracking for Hays Creek at Station 2-HYS001.41.

VADEQ ID	Date of Sample	Lab ID	HUP ID	Number of Isolates	E. coli (cfu/100 ml)	Wildlife	Human	Livestock	Pet
2-HYS001.41	7/11/05	D4528	I34	24	365	67%	8%	17%	8%
2-HYS001.41	8/22/05	D4670	I34	24	186	46%	0%	54%	0%
2-HYS001.41	9/12/05	D4761	I34	23	237	4%	30%	49%	17%
2-HYS001.41	10/18/05	D4869	I34	20	170	25%	10%	40%	25%
2-HYS001.41	11/14/05	D4942	I34	24	76	59%	25%	4%	12%
2-HYS001.41	12/12/05	D5035	I34	24	96	33%	21%	25%	21%
2-HYS001.41	1/23/06	D5218	I34	24	208	21%	46%	21%	12%
2-HYS001.41	2/21/06	D5386	I34	20	38	85%	0%	0%	15%
2-HYS001.41	3/14/06	D5489	I34	24	280	62%	4%	17%	17%
2-HYS001.41	4/10/06	D5625	I34	20	86	15%	20%	40%	25%
2-HYS001.41	5/16/2006	D5796	I34	21	350	0%	38%	62%	0%
2-HYS001.41	6/12/06	D5939	I34	23	980	43%	9%	22%	26%

BOLD type indicates a statistically significant value.

*NVI - No Viable isolates

Table 5.17 Bacterial Source Tracking for Ballinger Creek at Station 2-BLR003.00.

VADEQ ID	Date of Sample	Lab ID	HUP ID	Number of Isolates	<i>E. coli</i> (cfu/100 ml)	Wildlife	Human	Livestock	Pet
2-BLR003.00	7/11/05	D4530	H17	24	378	54%	0%	46%	0%
2-BLR003.00	8/22/05	D4672	H17	24	206	0%	0%	100%	0%
2-BLR003.00	9/12/05	D4763	H17	21	221	10%	38%	14%	38%
2-BLR003.00	10/18/05	D4871	H17	24	76	17%	63%	12%	8%
2-BLR003.00	11/14/05	D4944	H17	24	151	42%	42%	4%	12%
2-BLR003.00	12/12/05	D5037	H17	24	84	25%	12%	25%	38%
2-BLR003.00	1/23/06	D5220	H17	24	106	25%	12%	17%	46%
2-BLR003.00	2/21/06	D5388	H17	24	96	29%	0%	21%	50%
2-BLR003.00	3/14/06	D5491	H17	24	156	50%	8%	25%	17%
2-BLR003.00	4/10/06	D5627	H17	19	96	74%	5%	21%	0%
2-BLR003.00	5/16/2006	D5798	H17	24	320	0%	17%	62%	21%
2-BLR003.00	6/12/06	D5941	H17	24	200,000	25%	4%	63%	8%

BOLD type indicates a statistically significant value.

*NVI - No Viable isolates

Table 5.18 Bacterial Source Tracking for North Fork Hardware River at Station 2-HNF008.28.

VADEQ ID	Date of Sample	Lab ID	HUP ID	Number of Isolates	E. coli (cfu/100 ml)	Wildlife	Human	Livestock	Pet
2-HNF008.28	7/11/05	D4529	H18	24	337	42%	0%	58%	0%
2-HNF008.28	8/22/05	D4671	H18	24	353	0%	0%	100%	0%
2-HNF008.28	9/12/05	D4762	H18	21	318	14%	10%	57%	19%
2-HNF008.28	10/18/05	D4870	H18	21	357	29%	10%	51%	10%
2-HNF008.28	11/14/05	D4943	H18	24	80	29%	8%	42%	21%
2-HNF008.28	12/12/05	D5036	H18	24	68	17%	37%	21%	25%
2-HNF008.28	1/23/06	D5219	H18	24	78	0%	12%	29%	59%
2-HNF008.28	2/21/06	D5387	H18	6	12	66%	0%	17%	17%
2-HNF008.28	3/14/06	D5490	H18	24	88	29%	8%	25%	38%
2-HNF008.28	4/10/06	D5626	H18	16	46	25%	6%	69%	0%
2-HNF008.28	5/16/2006	D5797	H18	24	290	4%	21%	63%	12%
2-HNF008.28	6/12/06	D5940	H18	24	200,000	51%	4%	12%	33%

BOLD type indicates a statistically significant value.

*NVI - No Viable isolates

Table 5.19 Bacterial Source Tracking for Rock Island Creek at Station 2-RKI003.40.

VADEQ ID	Date of Sample	Lab ID	HUP ID	Number of Isolates	E. coli (cfu/100 ml)	Wildlife	Human	Livestock	Pet
2-RKI003.40	7/11/05	D4531	H17	24	72	92%	0%	8%	0%
2-RKI003.40	8/22/05	D4673	H17	17	40	47%	0%	47%	6%
2-RKI003.40	9/12/05	D4764	H17	12	18	25%	42%	25%	8%
2-RKI003.40	10/18/05	D4872	H17	24	149	17%	75%	4%	4%
2-RKI003.40	11/14/05	D4945	H17	24	58	29%	8%	0%	63%
2-RKI003.40	12/12/05	D5038	H17	24	56	72%	12%	12%	4%
2-RKI003.40	1/23/06	D5221	H17	24	56	71%	17%	8%	4%
2-RKI003.40	2/21/06	D5389	H17	5	12	0%	0%	0%	100%
2-RKI003.40	3/14/06	D5492	H17	4	20	0%	0%	25%	75%
2-RKI003.40	4/10/06	D5628	H17	2	6	100%	0%	0%	0%
2-RKI003.40	5/16/06	D5799	H17	21	90	71%	14%	5%	10%
2-RKI003.40	6/12/06	D5942	H17	24	1,480	63%	8%	12%	17%

BOLD type indicates a statistically significant value.

*NVI - No Viable isolates

Table 5.20 Bacterial Source Tracking for Cedar Grove Branch at Station 2-CGB001.80.

VADEQ ID	Date of Sample	Lab ID	HUP ID	Number of Isolates	E. coli (cfu/100 ml)	Wildlife	Human	Livestock	Pet
2-CGB001.80	7/11/2005	D4527	I33	24	281	67%	21%	4%	8%
2-CGB001.80	8/22/2005	D4669	I33	24	259	25%	12%	63%	0%
2-CGB001.80	9/12/2005	D4760	I33	24	239	75%	8%	17%	0%
2-CGB001.80	10/18/2005	D4868	I33	10	182	0%	50%	50%	0%
2-CGB001.80	11/14/2005	D4941	I33	24	78	12%	42%	38%	8%
2-CGB001.80	12/12/2005	D5034	I33	24	282	4%	8%	33%	55%
2-CGB001.80	1/23/2006	D5217	I33	24	279	46%	8%	17%	29%
2-CGB001.80	2/21/2006	D5385	I33	24	173	63%	12%	0%	25%
2-CGB001.80	3/14/2006	D5488	I33	24	410	75%	17%	4%	4%
2-CGB001.80	4/10/2006	D5624	I33	18	161	22%	28%	50%	0%
2-CGB001.80	5/16/2006	D5795	I33	23	230	39%	35%	13%	13%
2-CGB001.80	6/12/2006	D5938	I33	24	200,000	17%	0%	58%	25%

BOLD type indicates a statistically significant value.

*NVI - No Viable isolates

5.3 Results for South Central Region

The results of the water quality analyses for VADEQ's South Central Region (Figure 5.3) are reported in the following tables. Table 5.21 indicates the number of samples analyzed in the 2005-2006 sampling phase. Bacteria enumerations and optical brightener concentrations are reported in Tables 5.22 and 5.38. The results of the BST analysis are reported in Tables 5.39 and 5.55.

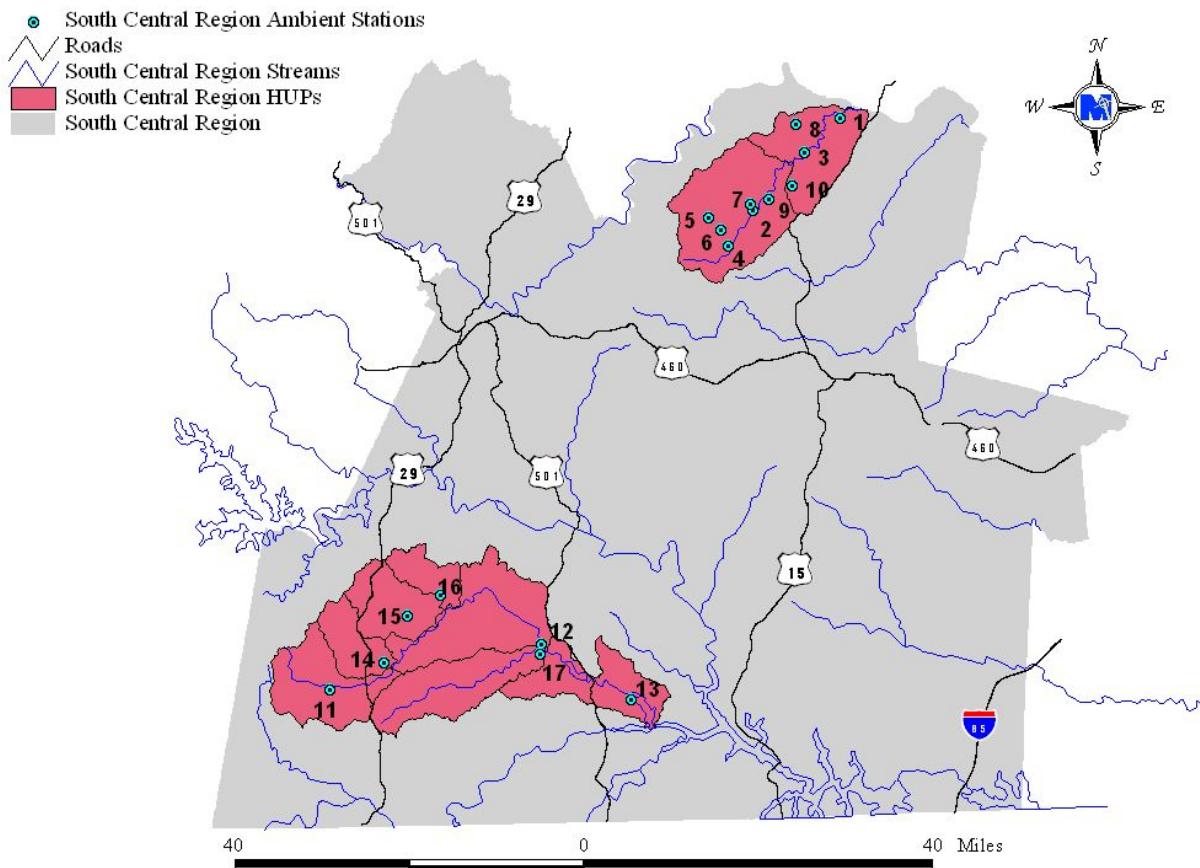


Figure 5.3 Bacterial sampling stations in VADEQ's South Central Region.

Table 5.21 Summary of bacterial sampling in VADEQ's South Central Region.

Station Number	Station ID	HUP	County / City	Stream Name	# of Samples Received	% Violations for E. Coli
1	2-SLT003.68	H22	Buckingham	Slate River	12	8%
2	2-SLT030.19	H21	Buckingham	Slate River	12	17%
3	2-SLT014.52	H22	Buckingham	Slate River	12	8%
4	2-SLT036.92	H21	Buckingham	Slate River	12	0%
5	2-AUS001.12	H21	Buckingham	Austin Creek	12	0%
6	2-FRY000.35	H21	Buckingham	Frisby Branch	1*	0%
7	2-NTH001.65	H21	Buckingham	North River	12	8%
8	2-SHR004.96	H22	Buckingham	Sharps Creek	11**	9%
9	2-TBM000.80	H21	Buckingham	Troublesome Creek	12	0%
10	2-TPN003.59	H22	Buckingham	Turpin Creek	11**	27%
11	4ABAN070.20	L65	Pittsylvania	Banister River	12	8%
12	4ABAN023.28	L67	Pittsylvania	Banister River	12	8%
13	4ABAN005.58	L71	Pittsylvania	Banister River	12	8%
14	4ACRR000.80	L66	Pittsylvania	Cherrystone Creek	12	8%
15	4AWRN005.50	L68	Pittsylvania	Whitehorn Creek	12	0%
16	4ASNE005.30	L69	Pittsylvania	Stinking River	12	17%
17	4ASNA000.20	L70	Halifax	Sandy Creek	12	0%

* Delisted

** This station limited to eleven samples pursuant to the clients request.

Table 5.22 Bacterial Enumeration for Slate River at Station 2-SLT003.68.

Station ID	Date of Sample	Lab ID	Lab-In Date	E. coli cfu/100ml	Quality	Fecal Coliform cfu/100ml	Quality	Optical Brighteners /ppb	Comments	Lab-Out Date	Lab Personnel
2-SLT003.68	7/19/2005	D4552	7/20/2005	36	B	80	B	58.50		7/22/2005	DM
2-SLT003.68	8/22/2005	D4674	8/23/2005	30	B	60	B	95.40		8/26/2005	DMT
2-SLT003.68	9/19/2005	D4797	9/20/2005	30	B	140	B	43.10		9/22/2005	DMT
2-SLT003.68	10/26/2005	D4908	10/27/2005	60				57.30		10/28/2005	DMT
2-SLT003.68	11/28/2005	D4999	11/29/2005	80				65.60		12/1/2005	DMT
2-SLT003.68	12/28/2005	D5109	12/29/2005	86				55.20		1/11/2006	DMT
2-SLT003.68	2/1/2006	D5267	2/2/2006	76				44.50		2/6/2006	DMT
2-SLT003.68	2/22/2006	D5390	2/23/2006	16	B			39.90		2/27/2006	DMT
2-SLT003.68	3/27/2006	D5544	3/28/2006	16	B			37.90		3/30/2006	DMT
2-SLT003.68	4/24/2006	D5708	4/25/2006	30	B			48.60		4/26/2006	DMT
2-SLT003.68	5/30/2006	D5881	5/31/2006	22	B			50.5		6/2/2006	DMT
2-SLT003.68	6/27/2006	D6043	6/28/2006	1,810	B			114.3		6/30/2006	MAF

A: Value reported is the mean of two or more determinations.

B: Results based upon colony counts outside the acceptable range

U: Material was analyzed for, but not detected. Value stored is the limit of detection for the process in use.

Originally, fecal coliform enumerations were to be done; however, as of October 4, 2005, the client requested that fecal coliform enumerations no longer be analyzed and reported.

Table 5.23 Bacterial Enumeration for Slate River at Station 2-SLT030.19.

Station ID	Date of Sample	Lab ID	Lab-In Date	E. coli cfu/100ml	Quality	Fecal Coliform cfu/100ml	Quality	Optical Brighteners /ppb	Comments	Lab-Out Date	Lab Personnel
2-SLT030.19	7/19/2005	D4553	7/20/2005	82		250		53.60		7/22/2005	DM
2-SLT030.19	8/22/2005	D4679	8/23/2005	40		90	B	63.00		8/26/2005	DMT
2-SLT030.19	9/19/2005	D4802	9/20/2005	176	A	220		42.10		9/22/2005	DMT
2-SLT030.19	10/26/2005	D4913	10/27/2005	46				53.20		10/28/2005	DMT
2-SLT030.19	11/28/2005	D5003	11/29/2005	210	A			53.40		12/1/2005	DMT
2-SLT030.19	12/28/2005	D5114	12/29/2005	26				57.60		1/11/2006	DMT
2-SLT030.19	2/1/2006	D5272	2/2/2006	84				43.50		2/6/2006	DMT
2-SLT030.19	2/22/2006	D5395	2/23/2006	52				39.40		2/27/2006	DMT
2-SLT030.19	3/27/2006	D5549	3/28/2006	32	B			34.80		3/30/2006	DMT
2-SLT030.19	4/24/2006	D5713	4/25/2006	64				47.30		4/26/2006	DMT
2-SLT030.19	5/30/2006	D5886	5/31/2006	300				48.2		6/2/2006	DMT
2-SLT030.19	6/27/2006	D6048	6/28/2006	330				65.5		6/30/2006	MAF

A: Value reported is the mean of two or more determinations.

B: Results based upon colony counts outside the acceptable range

U: Material was analyzed for, but not detected. Value stored is the limit of detection for the process in use.

Originally, fecal coliform enumerations were to be done; however, as of October 4, 2005, the client requested that fecal coliform enumerations no longer be analyzed and reported.

Table 5.24 Bacterial Enumeration for Slate River at Station 2-SLT014.52.

Station ID	Date of Sample	Lab ID	Lab-In Date	E. coli cfu/100ml	Quality	Fecal Coliform cfu/100ml	Quality	Optical Brighteners /ppb	Comments	Lab-Out Date	Lab Personnel
2-SLT014.52	7/19/2005	D4554	7/20/2005	46		130	B	55.10		7/22/2005	DM
2-SLT014.52	8/22/2005	D4676	8/23/2005	62	B	30	B	68.50		8/26/2005	DMT
2-SLT014.52	9/19/2005	D4799	9/20/2005	38	B	110	B	45.90		9/22/2005	DMT
2-SLT014.52	10/26/2005	D4910	10/27/2005	44				52.00		10/28/2005	DMT
2-SLT014.52	11/28/2005	D5001	11/29/2005	149	A			52.60		12/1/2005	DMT
2-SLT014.52	12/28/2005	D5111	12/29/2005	96				51.10		1/11/2006	DMT
2-SLT014.52	2/1/2006	D5269	2/2/2006	82				45.10		2/6/2006	DMT
2-SLT014.52	2/22/2006	D5392	2/23/2006	32	B			55.70		2/27/2006	DMT
2-SLT014.52	3/27/2006	D5546	3/28/2006	58				37.00		3/30/2006	DMT
2-SLT014.52	4/24/2006	D5710	4/25/2006	48				49.80		4/26/2006	DMT
2-SLT014.52	5/30/2006	D5883	5/31/2006	32	B			49.3		6/2/2006	DMT
2-SLT014.52	6/27/2006	D6045	6/28/2006	1,190				122.6		6/30/2006	MAF

A: Value reported is the mean of two or more determinations.

B: Results based upon colony counts outside the acceptable range

U: Material was analyzed for, but not detected. Value stored is the limit of detection for the process in use.

Originally, fecal coliform enumerations were to be done; however, as of October 4, 2005, the client requested that fecal coliform enumerations no longer be analyzed and reported.

Table 5.25 Bacterial Enumeration for Slate River at Station 2-SLT036.92.

Station ID	Date of Sample	Lab ID	Lab-In Date	E. coli cfu/100ml	Quality	Fecal Coliform cfu/100ml	Quality	Optical Brighteners /ppb	Comments	Lab-Out Date	Lab Personnel
2-SLT036.92	7/19/2005	D4555	7/20/2005	42		110	B	54.60		7/22/2005	DM
2-SLT036.92	8/22/2005	D4682	8/23/2005	4	B	70	B	48.60		8/26/2005	DMT
2-SLT036.92	9/19/2005	D4805	9/20/2005	80		200		42.40		9/22/2005	DMT
2-SLT036.92	10/26/2005	D4916	10/27/2005	134				48.20		10/28/2005	DMT
2-SLT036.92	11/28/2005	D5006	11/29/2005	48				53.40		12/1/2005	DMT
2-SLT036.92	12/28/2005	D5117	12/28/2005	90				47.50		1/11/2006	DMT
2-SLT036.92	2/1/2006	D5275	2/2/2006	10	B			41.40		2/6/2006	DMT
2-SLT036.92	2/22/2006	D5398	2/23/2006	6	B			35.90		2/27/2006	DMT
2-SLT036.92	3/27/2006	D5552	3/28/2006	10	B			29.60		3/30/2006	DMT
2-SLT036.92	4/24/2006	D5716	4/25/2006	20	B			44.90		4/26/2006	DMT
2-SLT036.92	5/30/2006	D5889	5/31/2006	44				41.7		6/2/2006	DMT
2-SLT036.92	6/27/2006	D6051	6/28/2006	220				74.9		6/30/2006	MAF

A: Value reported is the mean of two or more determinations.

B: Results based upon colony counts outside the acceptable range

U: Material was analyzed for, but not detected. Value stored is the limit of detection for the process in use.

Originally, fecal coliform enumerations were to be done; however, as of October 4, 2005, the client requested that fecal coliform enumerations no longer be analyzed and reported.

Table 5.26 Bacterial Enumeration for Austin Creek at Station 2-AUS001.12.

Station ID	Date of Sample	Lab ID	Lab-In Date	E. coli cfu/100ml	Quality	Fecal Coliform cfu/100ml	Quality	Optical Brighteners /ppb	Comments	Lab-Out Date	Lab Personnel
2-AUS001.12	7/19/2005	D4556	7/20/2005	84		180	B	47.10		7/22/2005	DM
2-AUS001.12	8/22/2005	D4681	8/23/2005	46		100	B	48.10		8/26/2005	DMT
2-AUS001.12	9/19/2005	D4804	9/20/2005	104		310		38.20		9/22/2005	DMT
2-AUS001.12	10/26/2005	D4915	10/27/2005	46				41.10		10/28/2005	DMT
2-AUS001.12	11/28/2005	D5005	11/29/2005	84				47.40		12/1/2005	DMT
2-AUS001.12	12/28/2005	D5116	12/29/2005	44				35.20		1/11/2006	DMT
2-AUS001.12	2/1/2006	D5274	2/2/2006	14	B			36.70		2/6/2006	DMT
2-AUS001.12	2/22/2006	D5397	2/23/2006	50				35.30		2/27/2006	DMT
2-AUS001.12	3/27/2006	D5551	3/28/2006	8	B			45.30		3/30/2006	DMT
2-AUS001.12	4/24/2006	D5715	4/25/2006	66				50.00		4/26/2006	DMT
2-AUS001.12	5/30/2006	D5888	5/31/2006	36	B			49		6/2/2006	DMT
2-AUS001.12	6/27/2006	D6050	6/28/2006	200				61.3		6/30/2006	MAF

A: Value reported is the mean of two or more determinations.

B: Results based upon colony counts outside the acceptable range

U: Material was analyzed for, but not detected. Value stored is the limit of detection for the process in use.

Originally, fecal coliform enumerations were to be done; however, as of October 4, 2005, the client requested that fecal coliform enumerations no longer be analyzed and reported.

Table 5.27 Bacterial Enumeration for Frisby Branch at Station 2-FRY000.35.

Station ID	Date of Sample	Lab ID	Lab-In Date	E. coli cfu/100ml	Quality	Fecal Coliform cfu/100ml	Quality	Optical Brighteners /ppb	Comments	Lab-Out Date	Lab Personnel
2-FRY000.35	7/19/2005	D4557	7/20/2005	84		240		52.30		7/22/2005	DM

A: Value reported is the mean of two or more determinations.

B: Results based upon colony counts outside the acceptable range

U: Material was analyzed for, but not detected. Value stored is the limit of detection for the process in use.

Originally, fecal coliform enumerations were to be done; however, as of October 4, 2005, the client requested that fecal coliform enumerations no longer be analyzed and reported.

Table 5.28 Bacterial Enumeration for North River at Station 2-NTH001.65.

Station ID	Date of Sample	Lab ID	Lab-In Date	E. coli cfu/100ml	Quality	Fecal Coliform cfu/100ml	Quality	Optical Brighteners /ppb	Comments	Lab-Out Date	Lab Personnel
2-NTH001.65	7/19/2005	D4558	7/20/2005	62		90	B	49.30		7/22/2005	DM
2-NTH001.65	8/22/2005	D4680	8/23/2005	28	B	50	B	52.90		8/26/2005	DMT
2-NTH001.65	9/19/2005	D4803	9/20/2005	24	B	20	B	40.80		9/22/2005	DMT
2-NTH001.65	10/26/2005	D4914	10/27/2005	50				47.10		10/28/2005	DMT
2-NTH001.65	11/28/2005	D5004	11/29/2005	183	A			50.30		12/1/2005	DMT
2-NTH001.65	12/28/2005	D5115	12/29/2005	80				43.20		1/11/2006	DMT
2-NTH001.65	2/1/2006	D5273	2/2/2006	108				39.00		2/6/2006	DMT
2-NTH001.65	2/22/2006	D5396	2/23/2006	72				44.90		2/27/2006	DMT
2-NTH001.65	3/27/2006	D5550	3/28/2006	68				36.10		3/30/2006	DMT
2-NTH001.65	4/24/2006	D5714	4/25/2006	52				48.40		4/26/2006	DMT
2-NTH001.65	5/30/2006	D5887	5/31/2006	14	B			48		6/2/2006	DMT
2-NTH001.65	6/27/2006	D6049	6/28/2006	240				81.3		6/30/2006	MAF

A: Value reported is the mean of two or more determinations.

B: Results based upon colony counts outside the acceptable range

U: Material was analyzed for, but not detected. Value stored is the limit of detection for the process in use.

Originally, fecal coliform enumerations were to be done; however, as of October 4, 2005, the client requested that fecal coliform enumerations no longer be analyzed and reported.

Table 5.29 Bacterial Enumeration for Sharps Creek at Station 2-SHR004.96.

Station ID	Date of Sample	Lab ID	Lab-In Date	E. coli cfu/100ml	Quality	Fecal Coliform cfu/100ml	Quality	Optical Brighteners /ppb	Comments	Lab-Out Date	Lab Personnel
2-SHR004.96	8/22/2005	D4675	8/23/2005	32	B	70	B	86.00		8/26/2005	DMT
2-SHR004.96	9/19/2005	D4798	9/20/2005	26	B	120	B	52.00		9/22/2005	DMT
2-SHR004.96	10/26/2005	D4909	10/27/2005	28	A			88.10		10/28/2005	DMT
2-SHR004.96	11/28/2005	D5000	11/29/2005	74				66.70		12/1/2005	DMT
2-SHR004.96	12/28/2005	D5110	12/29/2005	40				61.50		1/11/2006	DMT
2-SHR004.96	2/1/2006	D5268	2/2/2006	28	B			53.60		2/6/2006	DMT
2-SHR004.96	2/22/2006	D5391	2/23/2006	34	B			60.30		2/27/2006	DMT
2-SHR004.96	3/27/2006	D5545	3/28/2006	20	B			46.10		3/30/2006	DMT
2-SHR004.96	4/24/2006	D5709	4/25/2006	36	B			68.50		4/26/2006	DMT
2-SHR004.96	5/30/2006	D5882	5/31/2006	30	B			75		6/2/2006	DMT
2-SHR004.96	6/27/2006	D6044	6/28/2006	570				141.8		6/30/2006	MAF

A: Value reported is the mean of two or more determinations.

B: Results based upon colony counts outside the acceptable range

U: Material was analyzed for, but not detected. Value stored is the limit of detection for the process in use.

Originally, fecal coliform enumerations were to be done; however, as of October 4, 2005, the client requested that fecal coliform enumerations no longer be analyzed and reported.

Table 5.30 Bacterial Enumeration for Troublesome Creek at Station 2-TBM000.80.

Station ID	Date of Sample	Lab ID	Lab-In Date	E. coli cfu/100ml	Quality	Fecal Coliform cfu/100ml	Quality	Optical Brighteners /ppb	Comments	Lab-Out Date	Lab Personnel
2-TBM000.80	7/19/2005	D4559	7/20/2005	48		240		45.80		7/22/2005	DM
2-TBM000.80	8/22/2005	D4678	8/23/2005	2	B	1	U	53.00		8/26/2005	DMT
2-TBM000.80	9/19/2005	D4801	9/20/2005	102		120	B	48.00		9/22/2005	DMT
2-TBM000.80	10/26/2005	D4912	10/27/2005	16	B			38.60		10/28/2005	DMT
2-TBM000.80	12/20/2005	D5102	12/21/2005	54				59.30		12/29/2005	DMT
2-TBM000.80	12/28/2005	D5113	12/29/2005	24				57.30		1/11/2006	DMT
2-TBM000.80	2/1/2006	D5271	2/2/2006	4	B			48.20		2/6/2006	DMT
2-TBM000.80	2/22/2006	D5394	2/23/2006	2	B			44.90		2/27/2006	DMT
2-TBM000.80	3/27/2006	D5548	3/28/2006	10	B			37.20		3/30/2006	DMT
2-TBM000.80	4/24/2006	D5712	4/25/2006	4	B			37.30		4/26/2006	DMT
2-TBM000.80	5/30/2006	D5885	5/31/2006	26	B			33.3		6/2/2006	DMT
2-TBM000.80	6/27/2006	D6047	6/28/2006	44				40.25		6/30/2006	MAF

A: Value reported is the mean of two or more determinations.

B: Results based upon colony counts outside the acceptable range

U: Material was analyzed for, but not detected. Value stored is the limit of detection for the process in use.

Originally, fecal coliform enumerations were to be done; however, as of October 4, 2005, the client requested that fecal coliform enumerations no longer be analyzed and reported.

Table 5.31 Bacterial Enumeration for Turpin Creek at Station 2-TPN003.59.

Station ID	Date of Sample	Lab ID	Lab-In Date	E. coli cfu/100ml	Quality	Fecal Coliform cfu/100ml	Quality	Optical Brighteners /ppb	Comments	Lab-Out Date	Lab Personnel
2-TPN003.59	8/22/2005	D4677	8/23/2005	250	A	450		100.00		8/26/2005	DMT
2-TPN003.59	9/19/2005	D4800	9/20/2005	231	A	530		110.00		9/22/2005	DMT
2-TPN003.59	10/26/2005	D4911	10/27/2005	159	A			78.20		10/28/2005	DMT
2-TPN003.59	11/28/2005	D5002	11/29/2005	194	A			78.90		12/1/2005	DMT
2-TPN003.59	12/28/2005	D5112	12/29/2005	149	A			66.80		1/11/2006	DMT
2-TPN003.59	2/1/2006	D5270	2/2/2006	192	A			64.10		2/6/2006	DMT
2-TPN003.59	2/22/2006	D5393	2/23/2006	60				57.90		2/27/2006	DMT
2-TPN003.59	3/27/2006	D5547	3/28/2006	82				51.20		3/30/2006	DMT
2-TPN003.59	4/24/2006	D5711	4/25/2006	76				67.80		4/26/2006	DMT
2-TPN003.59	5/30/2006	D5884	5/31/2006	430				85.2		6/2/2006	DMT
2-TPN003.59	6/27/2006	D6046	6/28/2006	200,000				93		6/30/2006	MAF

A: Value reported is the mean of two or more determinations.

B: Results based upon colony counts outside the acceptable range

U: Material was analyzed for, but not detected. Value stored is the limit of detection for the process in use.

Originally, fecal coliform enumerations were to be done; however, as of October 4, 2005, the client requested that fecal coliform enumerations no longer be analyzed and reported.

Table 5.32 Bacterial Enumeration for Banister River at Station 4ABAN070.20.

Station ID	Date of Sample	Lab ID	Lab-In Date	E. coli cfu/100ml	Quality	Fecal Coliform cfu/100ml	Quality	Optical Brighteners /ppb	Comments	Lab-Out Date	Lab Personnel
4ABAN070.20	7/26/2005	D4593	7/27/2005	198	A	370		38.70		7/29/2005	DMT
4ABAN070.20	8/31/2005	D4728	9/1/2005	96		620		41.30		9/6/2005	DMT
4ABAN070.20	9/27/2005	D4826	9/28/2005	186		310		41.40		9/30/2005	DMT
4ABAN070.20	10/18/2005	D4880	10/19/2005	88				42.50		10/24/2005	DMT
4ABAN070.20	11/16/2005	D4991	11/17/2005	169	A			62.40		11/18/2005	DMT
4ABAN070.20	12/13/2005	D5068	12/14/2005	84				47.50		12/16/2005	DMT
4ABAN070.20	1/10/2006	D5148	1/11/2006	102				43.80		1/17/2006	DMT
4ABAN070.20	2/7/2006	D5302	2/8/2006	62				41.90		2/9/2006	DMT
4ABAN070.20	3/14/2006	D5493	3/15/2006	100				51.20		3/18/2006	DMT
4ABAN070.20	4/11/2006	D5641	4/12/2006	80				55.70		4/14/2006	DMT
4ABAN070.20	5/23/2006	D5863	5/24/2006	124				51.7		5/31/2006	MAF
4ABAN070.20	6/20/2006	D5989	6/21/2006	240				56.2		6/26/2006	MAF

A: Value reported is the mean of two or more determinations.

B: Results based upon colony counts outside the acceptable range

U: Material was analyzed for, but not detected. Value stored is the limit of detection for the process in use.

Originally, fecal coliform enumerations were to be done; however, as of October 4, 2005, the client requested that fecal coliform enumerations no longer be analyzed and reported.

Table 5.33 Bacterial Enumeration for Banister River at Station 4ABAN023.28.

Station ID	Date of Sample	Lab ID	Lab-In Date	E. coli cfu/100ml	Quality	Fecal Coliform cfu/100ml	Quality	Optical Brighteners /ppb	Comments	Lab-Out Date	Lab Personnel
4ABAN023.28	7/25/2005	D4581	7/26/2005	72		50	B	48.30		7/29/2005	DMT
4ABAN023.28	8/30/2005	D4715	8/31/2005	68		220		38.10		9/2/2005	DMT
4ABAN023.28	9/26/2005	D4818	9/27/2005	60		340		37.80		9/30/2005	DMT
4ABAN023.28	10/17/2005	D4857	10/18/2005	84				45.60		10/24/2005	DMT
4ABAN023.28	11/15/2005	D4973	11/16/2005	78				69.50		11/18/2005	DMT
4ABAN023.28	12/12/2005	D5031	12/13/2005	84				60.20		12/16/2005	DMT
4ABAN023.28	1/9/2006	D5134	1/10/2006	82				43.50		1/17/2006	DMT
4ABAN023.28	2/6/2006	D5294	2/7/2006	337	A			76.70		2/9/2006	DMT
4ABAN023.28	3/13/2006	D5480	3/14/2006	40				61.70		3/18/2006	DMT
4ABAN023.28	4/10/2006	D5630	4/11/2006	66				40.30		4/12/2006	DMT
4ABAN023.28	5/22/2006	D5836	5/23/2006	84				42.9		5/31/2006	MAF
4ABAN023.28	6/19/2006	D5973	6/20/2006	220				45.7		6/26/2006	MAF

A: Value reported is the mean of two or more determinations.

B: Results based upon colony counts outside the acceptable range

U: Material was analyzed for, but not detected. Value stored is the limit of detection for the process in use.

Originally, fecal coliform enumerations were to be done; however, as of October 4, 2005, the client requested that fecal coliform enumerations no longer be analyzed and reported.

Table 5.34 Bacterial Enumeration for Banister River at Station 4ABAN005.58.

Station ID	Date of Sample	Lab ID	Lab-In Date	E. coli cfu/100ml	Quality	Fecal Coliform cfu/100ml	Quality	Optical Brighteners /ppb	Comments	Lab-Out Date	Lab Personnel
4ABAN005.58	7/25/2005	D4582	7/26/2005	14	B	50	B	41.10		7/29/2005	DMT
4ABAN005.58	8/30/2005	D4717	8/31/2005	32	B	100	B	48.00		9/2/2005	DMT
4ABAN005.58	9/26/2005	D4820	9/27/2005	48		50	B	42.60		9/30/2005	DMT
4ABAN005.58	10/17/2005	D4859	10/18/2005	60				72.20		10/24/2005	DMT
4ABAN005.58	11/15/2005	D4975	11/16/2005	28	B			55.80		11/18/2005	DMT
4ABAN005.58	12/12/2005	D5033	12/13/2005	286	A			74.30		12/16/2005	DMT
4ABAN005.58	1/9/2006	D5136	1/10/2006	36	B			54.40		1/17/2006	DMT
4ABAN005.58	2/6/2006	D5296	2/7/2006	52				50.30		2/9/2006	DMT
4ABAN005.58	3/13/2006	D5482	3/14/2006	16	B			43.20		3/18/2006	DMT
4ABAN005.58	4/10/2006	D5632	4/11/2006	10	B			49.70		4/12/2006	DMT
4ABAN005.58	5/22/2006	D5838	5/23/2006	4	B			50		5/31/2006	MAF
4ABAN005.58	6/19/2006	D5975	6/20/2006	12	B			52.8		6/26/2006	MAF

A: Value reported is the mean of two or more determinations.

B: Results based upon colony counts outside the acceptable range

U: Material was analyzed for, but not detected. Value stored is the limit of detection for the process in use.

Originally, fecal coliform enumerations were to be done; however, as of October 4, 2005, the client requested that fecal coliform enumerations no longer be analyzed and reported.

Table 5.35 Bacterial Enumeration for Cherrystone Creek at Station 4ACRR000.80.

Station ID	Date of Sample	Lab ID	Lab-In Date	E. coli cfu/100ml	Quality	Fecal Coliform cfu/100ml	Quality	Optical Brighteners /ppb	Comments	Lab-Out Date	Lab Personnel
4ACRR000.80	7/26/2005	D4594	7/27/2005	355	A	500		32.10		7/29/2005	DMT
4ACRR000.80	8/31/2005	D4729	9/1/2005	207	A	1625	A	38.60		9/6/2005	DMT
4ACRR000.80	9/27/2005	D4827	9/28/2005	207	A	370		39.30		9/30/2005	DMT
4ACRR000.80	10/18/2005	D4881	10/19/2005	192				38.20		10/24/2005	DMT
4ACRR000.80	11/16/2005	D4992	11/17/2005	96				56.40		11/18/2005	DMT
4ACRR000.80	12/13/2005	D5069	12/14/2005	92				52.20		12/16/2005	DMT
4ACRR000.80	1/10/2006	D5149	1/11/2006	66				43.80		1/17/2006	DMT
4ACRR000.80	2/7/2006	D5303	2/8/2006	64				40.10		2/9/2006	DMT
4ACRR000.80	3/14/2006	D5494	3/15/2006	66				42.30		3/18/2006	DMT
4ACRR000.80	4/11/2006	D5642	4/12/2006	106				38.80		4/14/2006	DMT
4ACRR000.80	5/23/2006	D5864	5/24/2006	112				42.1		5/31/2006	MAF
4ACRR000.80	6/20/2006	D5990	6/21/2006	152				50.6		6/26/2006	MAF

A: Value reported is the mean of two or more determinations.

B: Results based upon colony counts outside the acceptable range

U: Material was analyzed for, but not detected. Value stored is the limit of detection for the process in use.

Originally, fecal coliform enumerations were to be done; however, as of October 4, 2005, the client requested that fecal coliform enumerations no longer be analyzed and reported.

Table 5.36 Bacterial Enumeration for Whitehorn Creek at Station 4AWRN005.50.

Station ID	Date of Sample	Lab ID	Lab-In Date	<i>E. coli</i> cfu/100 ml	Quality	Fecal Coliform cfu/100ml	Quality	Optical Brighteners /ppb	Comments	Lab-Out Date	Lab Personnel
4AWRN005.50	7/26/2005	D4595	7/27/2005	215	A	350		20.60		7/29/2005	DMT
4AWRN005.50	8/31/2005	D4730	9/1/2005	148	A	320		30.60		9/6/2005	DMT
4AWRN005.50	9/27/2005	D4828	9/28/2005	120		160	B	31.50		9/30/2005	DMT
4AWRN005.50	10/18/2005	D4882	10/19/2005	76				26.60		10/24/2005	DMT
4AWRN005.50	11/16/2005	D4993	11/17/2005	74				49.40		11/18/2005	DMT
4AWRN005.50	12/13/2005	D5070	12/14/2005	74				38.60		12/16/2005	DMT
4AWRN005.50	1/10/2006	D5150	1/11/2006	84				34.00		1/17/2006	DMT
4AWRN005.50	2/7/2006	D5304	2/8/2006	72				35.40		2/9/2006	DMT
4AWRN005.50	3/14/2006	D5495	3/15/2006	54				39.00		3/18/2006	DMT
4AWRN005.50	4/11/2006	D5643	4/12/2006	46				35.50		4/14/2006	DMT
4AWRN005.50	5/23/2006	D5865	5/24/2006	124				36.9		5/31/2006	MAF
4AWRN005.50	6/20/2006	D5991	6/21/2006	110				42.2		6/26/2006	MAF

A: Value reported is the mean of two or more determinations.

B: Results based upon colony counts outside the acceptable range

U: Material was analyzed for, but not detected. Value stored is the limit of detection for the process in use.

Originally, fecal coliform enumerations were to be done; however, as of October 4, 2005, the client requested that fecal coliform enumerations no longer be analyzed and reported.

Table 5.37 Bacterial Enumeration for Stinking River at Station 4ASNE005.30.

Station ID	Date of Sample	Lab ID	Lab-In Date	E. coli cfu/100ml	Quality	Fecal Coliform cfu/100ml	Quality	Optical Brighteners /ppb	Comments	Lab-Out Date	Lab Personnel
4ASNE005.30	7/25/2005	D4583	7/26/2005	168	A	260		40.00		7/29/2005	DMT
4ASNE005.30	8/30/2005	D4714	8/31/2005	218	A	300		62.70		9/2/2005	DMT
4ASNE005.30	9/26/2005	D4817	9/27/2005	223	A	350		26.10		9/30/2005	DMT
4ASNE005.30	10/17/2005	D4856	10/18/2005	190	A			30.40		10/24/2005	DMT
4ASNE005.30	11/15/2005	D4972	11/16/2005	68				44.60		11/18/2005	DMT
4ASNE005.30	12/12/2005	D5030	12/13/2005	90				39.60		12/16/2005	DMT
4ASNE005.30	1/9/2006	D5133	1/10/2006	64				32.00		1/17/2006	DMT
4ASNE005.30	2/6/2006	D5293	2/7/2006	78				49.90		2/9/2006	DMT
4ASNE005.30	3/13/2006	D5479	3/14/2006	42				64.30		3/18/2006	DMT
4ASNE005.30	4/10/2006	D5629	4/11/2006	118				36.30		4/12/2006	DMT
4ASNE005.30	5/22/2006	D5835	5/23/2006	440				36.8		5/31/2006	MAF
4ASNE005.30	6/19/2006	D5972	6/20/2006	580				43.7		6/26/2006	MAF

A: Value reported is the mean of two or more determinations.

B: Results based upon colony counts outside the acceptable range

U: Material was analyzed for, but not detected. Value stored is the limit of detection for the process in use.

Originally, fecal coliform enumerations were to be done; however, as of October 4, 2005, the client requested that fecal coliform enumerations no longer be analyzed and reported.

Table 5.38 Bacterial Enumeration for Sandy Creek at Station 4ASNA000.20.

Station ID	Date of Sample	Lab ID	Lab-In Date	E. coli cfu/100ml	Quality	Fecal Coliform cfu/100ml	Quality	Optical Brighteners /ppb	Comments	Lab-Out Date	Lab Personnel
4ASNA000.20	7/25/2005	D4584	7/26/2005	50		60	B	39.80		7/29/2005	DMT
4ASNA000.20	8/30/2005	D4716	8/31/2005	30	B	140	B	46.90		9/2/2005	DMT
4ASNA000.20	9/26/2005	D4819	9/27/2005	225	A	270		44.90		9/30/2005	DMT
4ASNA000.20	10/17/2005	D4858	10/18/2005	48				50.10		10/24/2005	DMT
4ASNA000.20	11/15/2005	D4974	11/16/2005	48				64.30		11/18/2005	DMT
4ASNA000.20	12/12/2005	D5032	12/13/2005	72				66.10		12/16/2005	DMT
4ASNA000.20	1/9/2006	D5135	1/10/2006	70				50.60		1/17/2006	DMT
4ASNA000.20	2/6/2006	D5295	2/7/2006	205	A			60.90		2/9/2006	DMT
4ASNA000.20	3/13/2006	D5481	3/14/2006	54				56.10		3/18/2006	DMT
4ASNA000.20	4/10/2006	D5631	4/11/2006	58				55.30		4/12/2006	DMT
4ASNA000.20	5/22/2006	D5837	5/23/2006	36	B			52.4		5/31/2006	MAF
4ASNA000.20	6/19/2006	D5974	6/20/2006	38	B			60.5		6/26/2006	MAF

A: Value reported is the mean of two or more determinations.

B: Results based upon colony counts outside the acceptable range

U: Material was analyzed for, but not detected. Value stored is the limit of detection for the process in use.

Originally, fecal coliform enumerations were to be done; however, as of October 4, 2005, the client requested that fecal coliform enumerations no longer be analyzed and reported.

Table 5.39 Bacterial Source Tracking for Slate River at Station 2-SLT003.68.

VADEQ ID	Date of Sample	Lab ID	HUP ID	Number of Isolates	E. coli (cfu/100 ml)	Wildlife	Human	Livestock	Pet
2-SLT003.68	7/19/05	D4552	H22	24	36	29%	63%	4%	4%
2-SLT003.68	8/22/05	D4674	H22	17	30	65%	6%	29%	0%
2-SLT003.68	9/19/05	D4797	H22	16	30	6%	63%	6%	25%
2-SLT003.68	10/26/05	D4908	H22	24	60	67%	4%	25%	4%
2-SLT003.68	11/28/05	D4999	H22	24	80	29%	17%	4%	50%
2-SLT003.68	12/28/05	D5109	H22	24	86	29%	21%	17%	33%
2-SLT003.68	2/1/06	D5267	H22	15	76	80%	7%	13%	0%
2-SLT003.68	2/22/06	D5390	H22	7	16	0%	42%	29%	29%
2-SLT003.68	3/27/06	D5544	H22	9	16	22%	11%	45%	22%
2-SLT003.68	4/24/06	D5708	H22	13	30	54%	31%	15%	0%
2-SLT003.68	5/30/06	D5881	H22	4	22	50%	50%	0%	0%
2-SLT003.68	6/27/06	D6043	H22	24	1,810	17%	0%	62%	21%

BOLD type indicates a statistically significant value.

*NVI - No Viable isolates

Table 5.40 Bacterial Source Tracking for Slate River at Station 2-SLT030.19.

VADEQ ID	Date of Sample	Lab ID	HUP ID	Number of Isolates	E. coli (cfu/100 ml)	Wildlife	Human	Livestock	Pet
2-SLT030.19	7/19/05	D4553	H21	24	82	0%	0%	75%	25%
2-SLT030.19	8/22/05	D4679	H21	17	40	12%	12%	6%	70%
2-SLT030.19	9/19/05	D4802	H21	24	176	29%	21%	38%	12%
2-SLT030.19	10/26/05	D4913	H21	19	46	32%	42%	21%	5%
2-SLT030.19	11/28/05	D5003	H21	24	210	12%	8%	51%	29%
2-SLT030.19	12/28/05	D5114	H21	18	26	39%	22%	11%	28%
2-SLT030.19	2/1/06	D5272	H21	24	84	88%	12%	0%	0%
2-SLT030.19	2/22/06	D5395	H21	23	52	48%	13%	30%	9%
2-SLT030.19	3/27/06	D5549	H21	15	32	66%	0%	7%	27%
2-SLT030.19	4/24/06	D5713	H21	24	64	38%	0%	33%	29%
2-SLT030.19	5/30/06	D5886	H21	23	300	4%	13%	9%	74%
2-SLT030.19	6/27/06	D6048	H21	24	330	29%	4%	38%	29%

BOLD type indicates a statistically significant value.

*NVI - No Viable isolates

Table 5.41 Bacterial Source Tracking for Slate River at Station 2-SLT014.52

VADEQ ID	Date of Sample	Lab ID	HUP ID	Number of Isolates	E. coli (cfu/100 ml)	Wildlife	Human	Livestock	Pet
2-SLT014.52	7/19/05	D4554	H22	24	46	0%	0%	100%	0%
2-SLT014.52	8/22/05	D4676	H22	24	62	8%	4%	29%	59%
2-SLT014.52	9/19/05	D4799	H22	21	38	33%	29%	19%	19%
2-SLT014.52	10/26/05	D4910	H22	23	44	26%	52%	9%	13%
2-SLT014.52	11/28/05	D5001	H22	24	149	17%	33%	8%	42%
2-SLT014.52	12/28/05	D5111	H22	24	96	25%	12%	4%	59%
2-SLT014.52	2/1/06	D5269	H22	24	82	80%	8%	0%	12%
2-SLT014.52	2/22/06	D5392	H22	15	32	27%	13%	60%	0%
2-SLT014.52	3/27/06	D5546	H22	18	58	34%	22%	22%	22%
2-SLT014.52	4/24/06	D5710	H22	24	48	63%	12%	25%	0%
2-SLT014.52	5/30/06	D5883	H22	12	32	92%	0%	0%	8%
2-SLT014.52	6/27/06	D6045	H22	24	1,190	29%	4%	67%	0%

BOLD type indicates a statistically significant value.

*NVI - No Viable isolates

Table 5.42 Bacterial Source Tracking for Slate River at Station 2-SLT036.92

VADEQ ID	Date of Sample	Lab ID	HUP ID	Number of Isolates	E. coli (cfu/100 ml)	Wildlife	Human	Livestock	Pet
2-SLT036.92	7/19/05	D4555	H21	24	42	0%	0%	100%	0%
2-SLT036.92	8/22/05	D4682	H21	3	4	0%	0%	0%	100%
2-SLT036.92	9/19/05	D4805	H21	24	80	8%	42%	8%	42%
2-SLT036.92	10/26/05	D4916	H21	24	134	4%	54%	25%	17%
2-SLT036.92	11/28/05	D5006	H21	24	48	17%	29%	8%	46%
2-SLT036.92	12/28/05	D5117	H21	24	90	29%	4%	17%	50%
2-SLT036.92	2/1/06	D5275	H21	6	10	83%	0%	17%	0%
2-SLT036.92	2/22/06	D5398	H21	1	6	0%	0%	100%	0%
2-SLT036.92	3/27/06	D5552	H21	5	10	20%	0%	40%	40%
2-SLT036.92	4/24/06	D5716	H21	20	20	20%	25%	55%	0%
2-SLT036.92	5/30/06	D5889	H21	16	44	12%	38%	0%	50%
2-SLT036.92	6/27/06	D6051	H21	24	220	63%	29%	4%	4%

BOLD type indicates a statistically significant value.

*NVI - No Viable isolates

Table 5.43 Bacterial Source Tracking for Austin Creek at Station 2-AUS001.12.

VADEQ ID	Date of Sample	Lab ID	HUP ID	Number of Isolates	E. coli (cfu/100 ml)	Wildlife	Human	Livestock	Pet
2-AUS001.12	7/19/05	D4556	H21	24	84	12%	50%	0%	38%
2-AUS001.12	8/22/05	D4681	H21	5	46	20%	40%	20%	20%
2-AUS001.12	9/19/05	D4804	H21	24	104	25%	33%	21%	21%
2-AUS001.12	10/26/05	D4915	H21	13	46	0%	47%	38%	15%
2-AUS001.12	11/28/05	D5005	H21	24	84	8%	21%	46%	25%
2-AUS001.12	12/28/05	D5116	H21	22	44	18%	27%	9%	46%
2-AUS001.12	2/1/06	D5274	H21	8	14	75%	0%	25%	0%
2-AUS001.12	2/22/06	D5397	H21	24	50	68%	8%	12%	12%
2-AUS001.12	3/27/06	D5551	H21	4	8	50%	0%	0%	50%
2-AUS001.12	4/24/06	D5715	H21	24	66	59%	8%	21%	12%
2-AUS001.12	5/30/06	D5888	H21	16	36	12%	31%	0%	57%
2-AUS001.12	6/27/06	D6050	H21	24	200	79%	17%	4%	0%

BOLD type indicates a statistically significant value.

*NVI - No Viable isolates

Table 5.44 Bacterial Source Tracking for Frisby Branch at Station 2-FRY000.35.

VADEQ ID	Date of Sample	Lab ID	HUP ID	Number of Isolates	E. coli (cfu/100 ml)	Wildlife	Human	Livestock	Pet
2-FRY000.35	7/19/05	D4557	H21	24	84	12%	12%	55%	21%

BOLD type indicates a statistically significant value.

*NVI - No Viable isolates

Table 5.45 Bacterial Source Tracking for North River at Station 2-NTH001.65.

VADEQ ID	Date of Sample	Lab ID	HUP ID	Number of Isolates	E. coli (cfu/100 ml)	Wildlife	Human	Livestock	Pet
2-NTH001.65	7/19/05	D4558	H21	24	62	0%	33%	55%	12%
2-NTH001.65	8/22/05	D4680	H21	10	28	0%	20%	0%	80%
2-NTH001.65	9/19/05	D4803	H21	15	24	0%	93%	7%	0%
2-NTH001.65	10/26/05	D4914	H21	24	50	12%	55%	25%	8%
2-NTH001.65	11/28/05	D5004	H21	24	183	12%	17%	17%	54%
2-NTH001.65	12/28/05	D5115	H21	24	80	22%	33%	12%	33%
2-NTH001.65	2/1/06	D5273	H21	24	108	58%	0%	42%	0%
2-NTH001.65	2/22/06	D5396	H21	24	72	51%	29%	12%	8%
2-NTH001.65	3/27/06	D5550	H21	24	68	75%	0%	8%	17%
2-NTH001.65	4/24/06	D5714	H21	16	52	12%	19%	38%	31%
2-NTH001.65	5/30/06	D5887	H21	3	14	0%	33%	0%	67%
2-NTH001.65	6/27/06	D6049	H21	24	240	17%	12%	46%	25%

BOLD type indicates a statistically significant value.

*NVI - No Viable isolates

Table 5.46 Bacterial Source Tracking for Sharps Creek at Station 2-SHR004.96.

VAEQ ID	Date of Sample	Lab ID	HUP ID	Number of Isolates	E. coli (cfu/100 ml)	Wildlife	Human	Livestock	Pet
2-SHR004.96	8/22/05	D4675	H22	14	32	0%	7%	29%	64%
2-SHR004.96	9/19/05	D4798	H22	22	26	9%	68%	5%	18%
2-SHR004.96	10/26/05	D4909	H22	14	28	50%	0%	50%	0%
2-SHR004.96	11/28/05	D5000	H22	23	74	35%	0%	0%	65%
2-SHR004.96	12/28/05	D5110	H22	24	40	55%	8%	4%	33%
2-SHR004.96	2/1/06	D5268	H22	23	28	57%	26%	17%	0%
2-SHR004.96	2/22/06	D5391	H22	12	34	42%	0%	58%	0%
2-SHR004.96	3/27/06	D5545	H22	13	20	31%	0%	8%	61%
2-SHR004.96	4/24/06	D5709	H22	17	36	35%	0%	24%	41%
2-SHR004.96	5/30/06	D5882	H22	8	30	0%	25%	0%	75%
2-SHR004.96	6/27/06	D6044	H22	24	570	46%	8%	42%	4%

BOLD type indicates a statistically significant value.

*NVI - No Viable isolates

Table 5.47 Bacterial Source Tracking for Troublesome Creek at Station 2-TBM000.80.

VADEQ ID	Date of Sample	Lab ID	HUP ID	Number of Isolates	E. coli (cfu/100 ml)	Wildlife	Human	Livestock	Pet
2-TBM000.80	7/19/05	D4559	H21	11	48	9%	46%	18%	27%
2-TBM000.80	8/22/05	D4678	H21	1	2	0%	0%	100%	0%
2-TBM000.80	9/19/05	D4801	H21	24	102	33%	42%	8%	17%
2-TBM000.80	10/26/05	D4912	H21	5	16	60%	40%	0%	0%
2-TBM000.80	12/20/05	D5102	H21	24	54	8%	17%	50%	25%
2-TBM000.80	12/28/05	D5113	H21	13	24	70%	15%	0%	15%
2-TBM000.80	2/1/06	D5271	H21	2	4	100%	0%	0%	0%
2-TBM000.80	2/22/06	D5394	H21	1	2	0%	0%	100%	0%
2-TBM000.80	3/27/06	D5548	H21	3	10	34%	33%	33%	0%
2-TBM000.80	4/24/06	D5712	H21	3	4	67%	33%	0%	0%
2-TBM000.80	5/30/06	D5885	H21	11	26	100%	0%	0%	0%
2-TBM000.80	6/27/06	D6047	H21	24	44	46%	4%	29%	21%

BOLD type indicates a statistically significant value.

*NVI - No Viable isolates

Table 5.48 Bacterial Source Tracking for Turpin Creek at Station 2-TPN003.59

VAEQ ID	Date of Sample	Lab ID	HUP ID	Number of Isolates	E. coli (cfu/100 ml)	Wildlife	Human	Livestock	Pet
2-TPN003.59	8/22/05	D4677	H22	24	250	4%	25%	67%	4%
2-TPN003.59	9/19/05	D4800	H22	23	231	9%	52%	26%	13%
2-TPN003.59	10/26/05	D4911	H22	24	159	25%	46%	25%	4%
2-TPN003.59	11/28/05	D5002	H22	24	194	17%	25%	21%	37%
2-TPN003.59	12/28/05	D5112	H22	24	149	8%	42%	38%	12%
2-TPN003.59	2/1/06	D5270	H22	24	192	88%	0%	12%	0%
2-TPN003.59	2/22/06	D5393	H22	24	60	29%	21%	50%	0%
2-TPN003.59	3/27/06	D5547	H22	22	82	36%	5%	54%	5%
2-TPN003.59	4/24/06	D5711	H22	24	76	67%	4%	25%	4%
2-TPN003.59	5/30/06	D5884	H22	23	430	22%	30%	26%	22%
2-TPN003.59	6/27/06	D6046	H22	24	200,000	0%	0%	100%	0%

BOLD type indicates a statistically significant value.

*NVI - No Viable isolates

Table 5.49 Bacterial Source Tracking for Banister River at Station 4ABAN070.20.

VADEQ ID	Date of Sample	Lab ID	HUP ID	Number of Isolates	E. coli (cfu/100 ml)	Wildlife	Human	Livestock	Pet
4ABAN070.20	7/26/05	D4593	L65	24	198	4%	0%	79%	17%
4ABAN070.20	8/31/05	D4728	L65	24	96	25%	21%	46%	8%
4ABAN070.20	9/27/05	D4826	L65	24	186	0%	8%	0%	92%
4ABAN070.20	10/18/05	D4880	L65	24	88	4%	0%	0%	96%
4ABAN070.20	11/16/05	D4991	L65	24	169	25%	4%	4%	67%
4ABAN070.20	12/13/05	D5068	L65	24	84	4%	4%	0%	92%
4ABAN070.20	1/10/06	D5148	L65	24	102	4%	0%	4%	92%
4ABAN070.20	2/7/06	D5302	L65	24	62	25%	0%	4%	71%
4ABAN070.20	3/14/06	D5493	L65	24	100	29%	0%	17%	54%
4ABAN070.20	4/11/06	D5641	L65	24	80	41%	0%	21%	38%
4ABAN070.20	5/23/06	D5863	L65	24	124	25%	0%	0%	75%
4ABAN070.20	6/20/06	D5989	L65	24	240	4%	4%	17%	75%

BOLD type indicates a statistically significant value.

*NVI - No Viable isolates

Table 5.50 Bacterial Source Tracking for Banister River at Station 4ABAN023.28.

VADEQ ID	Date of Sample	Lab ID	HUP ID	Number of Isolates	E. coli (cfu/100 ml)	Wildlife	Human	Livestock	Pet
4ABAN023.28	7/25/05	D4581	L67	24	72	25%	55%	8%	12%
4ABAN023.28	8/30/05	D4715	L67	22	68	59%	9%	5%	27%
4ABAN023.28	9/26/05	D4818	L67	24	60	88%	8%	0%	4%
4ABAN023.28	10/17/05	D4857	L67	24	84	38%	38%	0%	24%
4ABAN023.28	11/15/05	D4973	L67	24	78	17%	38%	12%	33%
4ABAN023.28	12/12/05	D5031	L67	24	84	29%	17%	17%	37%
4ABAN023.28	1/9/06	D5134	L67	24	82	8%	17%	4%	71%
4ABAN023.28	2/6/06	D5294	L67	24	337	12%	55%	8%	25%
4ABAN023.28	3/13/06	D5480	L67	15	40	20%	53%	27%	0%
4ABAN023.28	4/10/06	D5630	L67	24	66	88%	4%	8%	0%
4ABAN023.28	5/22/06	D5836	L67	4	84	0%	0%	25%	75%
4ABAN023.28	6/19/06	D5973	L67	24	220	17%	8%	58%	17%

BOLD type indicates a statistically significant value.

*NVI - No Viable isolates

Table 5.51 Bacterial Source Tracking for Banister River at Station 4ABAN005.58.

VADEQ ID	Date of Sample	Lab ID	HUP ID	Number of Isolates	E. coli (cfu/100 ml)	Wildlife	Human	Livestock	Pet
4ABAN005.58	7/25/2005	D4582	L71	8	14	25%	50%	0%	25%
4ABAN005.58	8/30/2005	D4717	L71	10	32	40%	20%	10%	30%
4ABAN005.58	9/26/2005	D4820	L71	24	48	38%	29%	12%	21%
4ABAN005.58	10/17/2005	D4859	L71	24	60	45%	21%	17%	17%
4ABAN005.58	11/15/2005	D4975	L71	24	28	8%	17%	8%	67%
4ABAN005.58	12/12/2005	D5033	L71	24	286	8%	38%	16%	38%
4ABAN005.58	1/9/2006	D5136	L71	22	36	91%	9%	0%	0%
4ABAN005.58	2/6/2006	D5296	L71	6	52	33%	50%	17%	0%
4ABAN005.58	3/13/2006	D5482	L71	13	16	15%	31%	54%	0%
4ABAN005.58	4/10/2006	D5632	L71	1	10	0%	0%	0%	100%
4ABAN005.58	5/22/2006	D5838	L71	5	4	20%	20%	60%	0%
4ABAN005.58	6/19/2006	D5975	L71	8	12	25%	50%	0%	25%

BOLD type indicates a statistically significant value.

*NVI - No Viable isolates

Table 5.52 Bacterial Source Tracking for Cherrystone Creek at Station 4ACRR000.80.

VAEQ ID	Date of Sample	Lab ID	HUP ID	Number of Isolates	E. coli (cfu/100 ml)	Wildlife	Human	Livestock	Pet
4ACRR000.80	7/26/05	D4594	L66	24	355	0%	100%	0%	0%
4ACRR000.80	8/31/05	D4729	L66	24	207	25%	42%	0%	33%
4ACRR000.80	9/27/05	D4827	L66	24	207	38%	42%	8%	12%
4ACRR000.80	10/18/05	D4881	L66	24	192	46%	42%	0%	12%
4ACRR000.80	11/16/05	D4992	L66	24	96	55%	4%	8%	33%
4ACRR000.80	12/13/05	D5069	L66	24	92	8%	4%	29%	59%
4ACRR000.80	1/10/06	D5149	L66	24	66	8%	4%	12%	76%
4ACRR000.80	2/7/06	D5303	L66	22	64	55%	27%	9%	9%
4ACRR000.80	3/14/06	D5494	L66	24	66	46%	46%	8%	0%
4ACRR000.80	4/11/06	D5642	L66	24	106	25%	33%	21%	21%
4ACRR000.80	5/23/06	D5864	L66	24	112	12%	12%	29%	47%
4ACRR000.80	6/20/06	D5990	L66	24	152	29%	25%	8%	38%

BOLD type indicates a statistically significant value.

*NVI - No Viable isolates

Table 5.53 Bacterial Source Tracking for Whitehorn Creek at Station 4AWRN005.50.

VADEQ ID	Date of Sample	Lab ID	HUP ID	Number of Isolates	E. coli (cfu/100 ml)	Wildlife	Human	Livestock	Pet
4AWRN005.50	7/26/05	D4595	L68	24	215	29%	12%	0%	59%
4AWRN005.50	8/31/05	D4730	L68	24	148	50%	33%	0%	17%
4AWRN005.50	9/27/05	D4828	L68	24	120	51%	33%	8%	8%
4AWRN005.50	10/18/05	D4882	L68	24	76	17%	29%	25%	29%
4AWRN005.50	11/16/05	D4993	L68	24	74	67%	0%	12%	21%
4AWRN005.50	12/13/05	D5070	L68	24	74	17%	33%	25%	25%
4AWRN005.50	1/10/06	D5150	L68	24	84	33%	21%	25%	21%
4AWRN005.50	2/7/06	D5304	L68	24	72	8%	63%	21%	8%
4AWRN005.50	3/14/06	D5495	L68	24	54	42%	33%	25%	0%
4AWRN005.50	4/11/06	D5643	L68	24	46	50%	29%	17%	4%
4AWRN005.50	5/23/06	D5865	L68	20	124	5%	10%	40%	45%
4AWRN005.50	6/20/06	D5991	L68	24	110	25%	34%	12%	29%

BOLD type indicates a statistically significant value.

*NVI - No Viable isolates

Table 5.54 Bacterial Source Tracking for Stinking River at Station 4ASNE005.30.

VADEQ ID	Date of Sample	Lab ID	HUP ID	Number of Isolates	E. coli (cfu/100 ml)	Wildlife	Human	Livestock	Pet
4ASNE005.30	7/25/05	D4583	L69	24	168	0%	100%	0%	0%
4ASNE005.30	8/30/05	D4714	L69	24	218	55%	25%	8%	12%
4ASNE005.30	9/26/05	D4817	L69	24	223	25%	21%	4%	50%
4ASNE005.30	10/17/05	D4856	L69	24	190	33%	46%	0%	21%
4ASNE005.30	11/15/05	D4972	L69	24	68	17%	67%	8%	8%
4ASNE005.30	12/12/05	D5030	L69	24	90	12%	12%	21%	55%
4ASNE005.30	1/9/06	D5133	L69	24	64	4%	17%	4%	75%
4ASNE005.30	2/6/06	D5293	L69	24	78	42%	33%	8%	17%
4ASNE005.30	3/13/06	D5479	L69	15	42	0%	73%	7%	20%
4ASNE005.30	4/10/06	D5629	L69	24	118	33%	26%	33%	8%
4ASNE005.30	5/22/06	D5835	L69	8	440	12%	25%	25%	38%
4ASNE005.30	6/19/06	D5972	L69	24	580	4%	21%	67%	8%

BOLD type indicates a statistically significant value.

*NVI - No Viable isolates

Table 5.55 Bacterial Source Tracking for Sandy Creek at Station 4ASNA000.20.

VADEQ ID	Date of Sample	Lab ID	HUP ID	Number of Isolates	E. coli (cfu/100 ml)	Wildlife	Human	Livestock	Pet
4ASNA000.20	7/25/05	D4584	L70	24	50	12%	88%	0%	0%
4ASNA000.20	8/30/05	D4716	L70	11	30	91%	0%	9%	0%
4ASNA000.20	9/26/05	D4819	L70	24	225	41%	21%	38%	0%
4ASNA000.20	10/17/05	D4858	L70	24	48	42%	16%	0%	42%
4ASNA000.20	11/15/05	D4974	L70	24	48	4%	33%	8%	55%
4ASNA000.20	12/12/05	D5032	L70	24	72	38%	8%	0%	54%
4ASNA000.20	1/9/06	D5135	L70	24	70	8%	17%	0%	75%
4ASNA000.20	2/6/06	D5295	L70	24	205	8%	88%	4%	0%
4ASNA000.20	3/13/06	D5481	L70	24	54	12%	59%	25%	4%
4ASNA000.20	4/10/06	D5631	L70	23	58	78%	0%	22%	0%
4ASNA000.20	5/22/06	D5837	L70	8	36	0%	0%	50%	50%
4ASNA000.20	6/19/06	D5974	L70	24	38	4%	21%	33%	42%

BOLD type indicates a statistically significant value.

*NVI - No Viable isolates

5.4 Results for Northern Region

The results of the water quality analyses for VADEQ's Northern Region (Figure 5.4) are reported in the following tables. Table 5.56 indicates the number of samples analyzed in the 2005-2006 sampling phase. Bacterial enumerations and optical brightener concentrations are reported in Tables 5.57 through 5.70. The results of the BST analysis are reported in Tables 5.71 through 5.84.

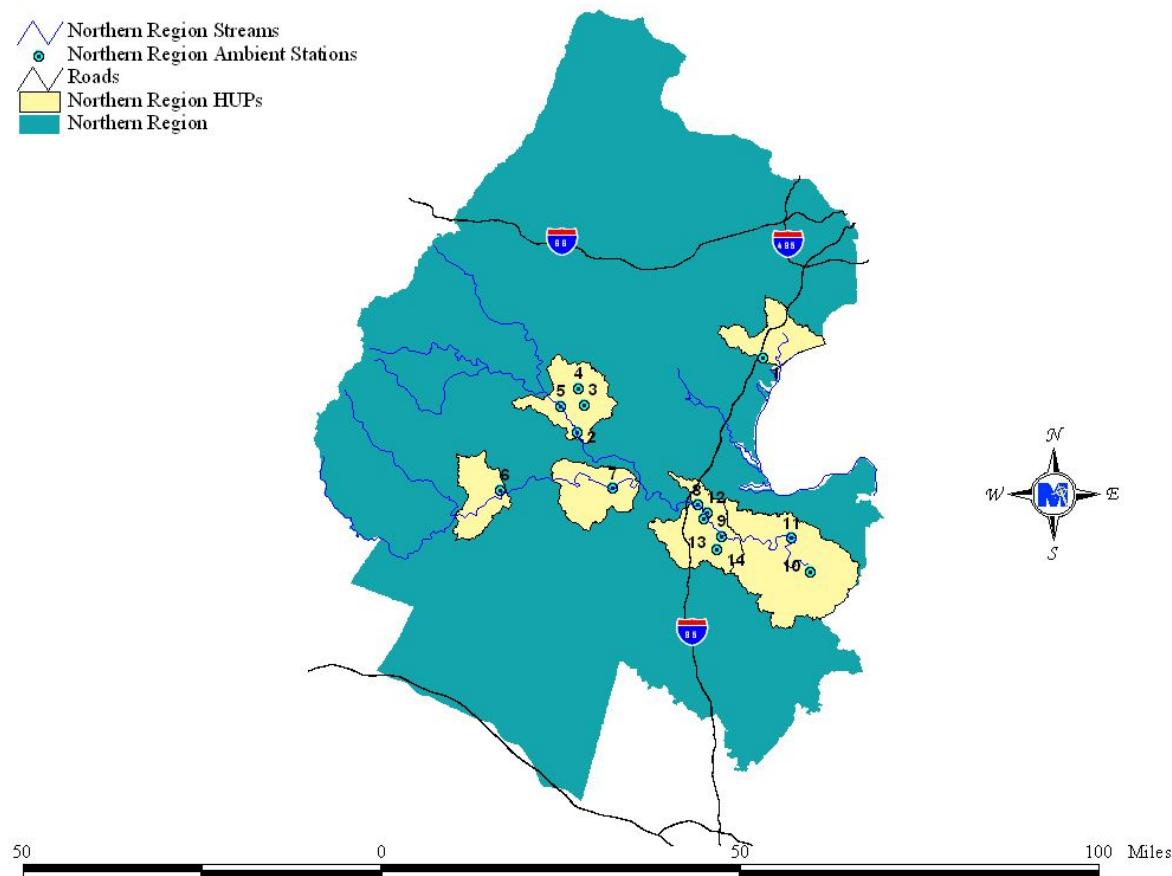


Figure 5.4 Bacterial sampling stations in VADEQ's Northern Region.

Table 5.56 Summary of bacterial sampling in VADEQ's Northern Region.

Station Number	Station ID	HUP	County / City	Stream Name	# of Samples Received	% Violations for <i>E. Coli</i>
1	1ANEA002.89	A25	Prince William	Neabsco Creek	12	17%
2	3-MAH000.19	E08	Fauquier	Marsh Run	12	8%
3	3-BOS000.72	E08	Fauquier	Browns Run	12	33%
4	3-CRA000.46	E08	Fauquier	Craig Run	11	36%
5	3-RPP147.10	E08	Culpeper	Rappahannock River	12	0%
6	3-CED000.59	E16	Culpeper	Cedar Run	12	0%
7	3-RAP006.53	E18	Culpeper	Rapidan River	12	8%
8	3-RPP110.57	E20	Fredericksburg	Rappahannock	12	17%
9	3-RPP104.47	E20	Fredericksburg	Rappahannock	11	18%
10	3-RPP080.19	E21	Caroline	Rappahannock	12	0%
11	3-RPP091.55	E21	Caroline	Rappahannock	12	8%
12	3-CLB000.50	E20	Stafford	Claiborne Run	12	33%
13	3-HAL000.57	E20	Fredericksburg	Hazel Run	12	25%
14	3-MAP002.61	E20	Spotsylvania	Massaponax Creek	12	33%

Table 5.57 Bacterial Enumeration for Neabsco Creek at Station 1ANEA002.89.

Station ID	Date of Sample	Lab ID	Lab-In Date	E. coli cfu/100ml	Quality	Fecal Coliform cfu/100ml	Quality	Optical Brighteners /ppb	Comments	Lab-Out Date	Lab Personnel
1ANEA002.89	7/20/2005	D4578	7/21/2005	96		330		41.40		7/25/2005	DM
1ANEA002.89	8/24/2005	D4706	8/25/2005	48		200		49.80		8/29/2005	DMT
1ANEA002.89	9/27/2005	D4825	9/28/2005	96		280		156.00		9/30/2005	DMT
1ANEA002.89	10/26/2005	D4921	10/27/2005	254	A			104.00		10/28/2005	DMT
1ANEA002.89	11/29/2005	D5013	11/30/2005	36	B			129.60		12/2/2005	DMT
1ANEA002.89	12/21/2005	D5103	12/22/2005	80				99.90		12/29/2005	DMT
1ANEA002.89	1/24/2006	D5245	1/25/2006	92				98.30		2/14/2006	DMT
1ANEA002.89	2/21/2006	D5381	2/22/2006	4	B			88.20		2/24/2006	DMT
1ANEA002.89	3/28/2006	D5568	3/29/2006	10	B			86.50		3/31/2006	DMT
1ANEA002.89	4/19/2006	D5704	4/20/2006	64				81.50		4/26/2006	DMT
1ANEA002.89	5/9/2006	D5776	5/10/2006	186	A			109.9		5/15/2006	DMT
1ANEA002.89	6/21/2006	D6026	6/22/2006	320				129.6		6/26/2006	MAF

A: Value reported is the mean of two or more determinations.

B: Results based upon colony counts outside the acceptable range

U: Material was analyzed for, but not detected. Value stored is the limit of detection for the process in use

Originally, fecal coliform enumerations were to be done; however, as of October 4, 2005, the client requested that fecal coliform enumerations no longer be analyzed and reported..

Table 5.58 Bacterial Enumeration for Marsh Run at Station 3-MAH000.19.

Station ID	Date of Sample	Lab ID	Lab-In Date	E. coli cfu/100ml	Quality	Fecal Coliform cfu/100ml	Quality	Optical Brighteners /ppb	Comments	Lab-Out Date	Lab Personnel
3-MAH000.19	7/6/2005	D4523	7/7/2005	72		50	B			7/22/2005	DM
3-MAH000.19	8/17/2005	D4659	8/18/2005	50		310		88.10		8/23/2005	DMT
3-MAH000.19	9/14/2005	D4769	9/15/2005	12	B	50	B	116.00		9/17/2005	DMT
3-MAH000.19	10/18/2005	D4877	10/19/2005	22	B			121.00		10/24/2005	DMT
3-MAH000.19	11/15/2005	D4976	11/17/2005	14	B			118.90		11/18/2005	DMT
3-MAH000.19	12/12/2005	D5041	12/13/2005	287	A			138.10		12/16/2005	DMT
3-MAH000.19	1/9/2006	D5137	1/10/2006	157	A			95.70		1/17/2006	DMT
3-MAH000.19	2/7/2006	D5305	2/8/2006	78				116.10		2/9/2006	DMT
3-MAH000.19	3/14/2006	D5496	3/15/2006	56				71.70		3/18/2006	DMT
3-MAH000.19	4/11/2006	D5644	4/12/2006	98	L			97.20		4/14/2006	DMT
3-MAH000.19	5/2/2006	D5756	5/3/2006	74				110.10		5/9/2006	DMT
3-MAH000.19	6/13/2006	D5961	6/14/2006	56	L			98.60		6/16/2006	MAF

A: Value reported is the mean of two or more determinations.

B: Results based upon colony counts outside the acceptable range

U: Material was analyzed for, but not detected. Value stored is the limit of detection for the process in use.

Originally, fecal coliform enumerations were to be done; however, as of October 4, 2005, the client requested that fecal coliform enumerations no longer be analyzed and reported.

Table 5.59 Bacterial Enumeration for Browns Run at Station 3-BOS000.72.

Station ID	Date of Sample	Lab ID	Lab-In Date	E. coli cfu/100ml	Quality	Fecal Coliform cfu/100ml	Quality	Optical Brighteners /ppb	Comments	Lab-Out Date	Lab Personnel
3-BOS000.72	7/6/2005	D4520	7/7/2005	82		100	B			7/22/2005	DM
3-BOS000.72	8/17/2005	D4657	8/18/2005	125	A	260		27.20		8/23/2005	DMT
3-BOS000.72	10/18/2005	D4874	10/19/2005	308	A			88.40		10/24/2005	DMT
3-BOS000.72	11/15/2005	D4977	11/17/2005	44				145.50		11/18/2005	DMT
3-BOS000.72	12/12/2005	D5043	12/13/2005	348	A			152.50		12/16/2005	DMT
3-BOS000.72	1/9/2006	D5138	1/10/2006	74				107.50		1/17/2006	DMT
3-BOS000.72	2/7/2006	D5306	2/8/2006	80				124.80		2/9/2006	DMT
3-BOS000.72	3/14/2006	D5497	3/15/2006	132				106.80		3/18/2006	DMT
3-BOS000.72	4/11/2006	D5645	4/12/2006	104				127.30		4/14/2006	DMT
3-BOS000.72	5/2/2006	D5757	5/3/2006	330				127.3		5/9/2006	DMT
3-BOS000.72	6/13/2006	D5962	6/14/2006	700				116.9		6/16/2006	MAF
3-BOS000.72	7/25/2006	D6165	7/26/2006	20	B			158.2		7/28/2006	MAF

A: Value reported is the mean of two or more determinations.

B: Results based upon colony counts outside the acceptable range

U: Material was analyzed for, but not detected. Value stored is the limit of detection for the process in use.

Originally, fecal coliform enumerations were to be done; however, as of October 4, 2005, the client requested that fecal coliform enumerations no longer be analyzed and reported.

Table 5.60 Bacterial Enumeration for Craig Run at Station 3-CRA000.46.

Station ID	Date of Sample	Lab ID	Lab-In Date	E. coli cfu/100ml	Quality	Fecal Coliform cfu/100ml	Quality	Optical Brighteners /ppb	Comments	Lab-Out Date	Lab Personnel
3-CRA000.46	7/6/2005	D4521	7/7/2005	243	A	200				7/22/2005	DM
3-CRA000.46	10/18/2005	D4875	10/19/2005	54				103.00		10/24/2005	DMT
3-CRA000.46	11/15/2005	D4978	11/17/2005	20	B			104.30		11/18/2005	DMT
3-CRA000.46	12/12/2005	D5039	12/13/2005	630				108.40		12/16/2005	DMT
3-CRA000.46	1/9/2006	D5139	1/10/2006	76				70.60		1/17/2006	DMT
3-CRA000.46	2/7/2006	D5307	2/8/2006	48				95.60		2/9/2006	DMT
3-CRA000.46	3/14/2006	D5498	3/15/2006	68				83.90		3/18/2006	DMT
3-CRA000.46	4/11/2006	D5646	4/12/2006	26	L			114.80		4/14/2006	DMT
3-CRA000.46	5/2/2006	D5758	5/3/2006	24	B			113.00		5/9/2006	DMT
3-CRA000.46	6/13/2006	D5963	6/14/2006	510	L			125.10		6/16/2006	MAF
3-CRA000.46	7/25/2006	D6166	7/26/2006	310	L			180.4		7/28/2006	MAF
3-CRA000.46	10/3/2006	D6451	10/4/2006	34	B			122.4		10/6/2006	MAF

A: Value reported is the mean of two or more determinations.

B: Results based upon colony counts outside the acceptable range

U: Material was analyzed for, but not detected. Value stored is the limit of detection for the process in use.

Originally, fecal coliform enumerations were to be done; however, as of October 4, 2005, the client requested that fecal coliform enumerations no longer be analyzed and reported.

Table 5.61 Bacterial Enumeration for Rappahannock River at Station 3-RPP147.10.

Station ID	Date of Sample	Lab ID	Lab-In Date	E. coli cfu/100ml	Quality	Fecal Coliform cfu/100ml	Quality	Optical Brighteners /ppb	Comments	Lab-Out Date	Lab Personnel
3-RPP147.10	7/6/2005	D4522	7/7/2005	220	A	160	B			7/22/2005	DM
3-RPP147.10	8/17/2005	D4660	8/18/2005	84		1175	A	73.50		8/23/2005	DMT
3-RPP147.10	9/14/2005	D4770	9/15/2005	100		130	B	32.50		9/17/2005	DMT
3-RPP147.10	10/18/2005	D4878	10/19/2005	74				37.80		10/24/2005	DMT
3-RPP147.10	11/15/2005	D4979	11/17/2005	60				47.00		11/18/2005	DMT
3-RPP147.10	12/12/2005	D5040	12/13/2005	163	A			40.50		12/16/2005	DMT
3-RPP147.10	1/9/2006	D5140	1/10/2006	60				29.50		1/17/2006	DMT
3-RPP147.10	2/7/2006	D5308	2/8/2006	30	B			37.50		2/9/2006	DMT
3-RPP147.10	3/14/2006	D5499	3/15/2006	56				33.30		3/18/2006	DMT
3-RPP147.10	4/11/2006	D5647	4/12/2006	42				35.90		4/14/2006	DMT
3-RPP147.10	5/2/2006	D5759	5/3/2006	94				92.10		5/9/2006	DMT
3-RPP147.10	6/13/2006	D5964	6/14/2006	42				41.90		6/16/2006	MAF

A: Value reported is the mean of two or more determinations.

B: Results based upon colony counts outside the acceptable range

U: Material was analyzed for, but not detected. Value stored is the limit of detection for the process in use.

Originally, fecal coliform enumerations were to be done; however, as of October 4, 2005, the client requested that fecal coliform enumerations no longer be analyzed and reported.

Table 5.62 Bacterial Enumeration for Cedar Run at Station 3-CED000.59.

Station ID	Date of Sample	Lab ID	Lab-In Date	E. coli cfu/100 ml	Quality	Fecal Coliform cfu/100ml	Quality	Optical Brighteners /ppb	Comments	Lab-Out Date	Lab Personnel
3-CED000.59	7/12/2005	D4533	7/13/2005	60		110	B	Sample was depleted at time of filtering		7/22/2005	DM
3-CED000.59	8/3/2005	D4641	8/4/2005	36	B	60	B	33.60		8/5/2005	DMT
3-CED000.59	9/7/2005	D4744	9/8/2005	18	B	520		81.20		9/9/2005	DMT
3-CED000.59	10/19/2005	D4900	10/20/2005	34	B			68.70		10/26/2005	DMT
3-CED000.59	11/16/2005	D4995	11/17/2005	48				80.90		11/18/2005	DMT
3-CED000.59	12/19/2005	D5100	12/20/2005	210	A			90.70		1/18/2006	DMT
3-CED000.59	1/10/2006	D5147	1/11/2006	32	B			62.00		1/27/2006	DMT
3-CED000.59	2/14/2006	D5354	2/15/2006	28	B			92.80		2/20/2006	DMT
3-CED000.59	3/22/2006	D5536	3/23/2006	8	B			53.70		3/27/2006	DMT
3-CED000.59	4/26/2006	D5733	4/27/2006	134				122.3		5/9/2006	DMT
3-CED000.59	5/31/2006	D5894	6/1/2006	22	B			94.8		6/5/2006	MAF
3-CED000.59	7/11/2006	D6081	7/12/2006	88				124.7		7/19/2006	MAF

A: Value reported is the mean of two or more determinations.

B: Results based upon colony counts outside the acceptable range

U: Material was analyzed for, but not detected. Value stored is the limit of detection for the process in use.

Originally, fecal coliform enumerations were to be done; however, as of October 4, 2005, the client requested that fecal coliform enumerations no longer be analyzed and reported.

Table 5.63 Bacterial Enumeration for Rapidan River at Station 3-RAP006.53.

Station ID	Date of Sample	Lab ID	Lab-In Date	E. coli cfu/100ml	Quality	Fecal Coliform cfu/100ml	Quality	Optical Brighteners /ppb	Comments	Lab-Out Date	Lab Personnel
3-RAP006.53	7/12/2005	D4532	7/13/2005	96		70	B	48.00		7/22/2005	DM
3-RAP006.53	8/3/2005	D4640	8/4/2005	30	B	20	B	122.00		8/5/2005	DMT
3-RAP006.53	9/7/2005	D4743	9/8/2005	28	B	50	B	34.10		9/9/2005	DMT
3-RAP006.53	10/19/2005	D4899	10/20/2005	56				31.30		10/26/2005	DMT
3-RAP006.53	11/16/2005	D4994	11/17/2005	60				45.70		11/18/2005	DMT
3-RAP006.53	12/19/2005	D5101	12/20/2005	223	A			57.40		1/18/2006	DMT
3-RAP006.53	1/10/2006	D5146	1/11/2006	140	A			33.20		1/17/2006	DMT
3-RAP006.53	2/14/2006	D5353	2/15/2006	60				76.00		2/20/2006	DMT
3-RAP006.53	3/22/2006	D5535	3/23/2006	6	B			31.00		3/27/2006	DMT
3-RAP006.53	4/26/2006	D5732	4/27/2006	310				52.30		5/9/2006	DMT
3-RAP006.53	5/31/2006	D5893	6/1/2006	24	B			50.60		6/5/2006	MAF
3-RAP006.53	7/11/2006	D6080	7/12/2006	58				50		7/19/2006	MAF

A: Value reported is the mean of two or more determinations.

B: Results based upon colony counts outside the acceptable range

U: Material was analyzed for, but not detected. Value stored is the limit of detection for the process in use.

Originally, fecal coliform enumerations were to be done; however, as of October 4, 2005, the client requested that fecal coliform enumerations no longer be analyzed and reported.

Table 5.64 Bacterial Enumeration for Rappahannock River at Station 3-RPP110.57.

Station ID	Date of Sample	Lab ID	Lab-In Date	E. coli cfu/100ml	Quality	Fecal Coliform cfu/100ml	Quality	Optical Brighteners /ppb	Comments	Lab-Out Date	Lab Personnel
3-RPP110.57	7/20/2005	D4574	7/21/2005	92		110	B	Sample was depleted at time of filtering		7/25/2005	DM
3-RPP110.57	8/24/2005	D4702	8/25/2005	56		340		103.00		8/29/2005	DMT
3-RPP110.57	9/27/2005	D4821	9/28/2005	68		290		34.50		9/30/2005	DMT
3-RPP110.57	10/26/2005	D4920	10/27/2005	328	A			113.00		10/28/2005	DMT
3-RPP110.57	11/29/2005	D5012	11/30/2005	62				46.30		12/2/2005	DMT
3-RPP110.57	12/21/2005	D5104	12/22/2005	60				49.80		12/29/2005	DMT
3-RPP110.57	1/24/2006	D5244	1/25/2006	356	A			86.00		1/27/2006	DMT
3-RPP110.57	2/21/2006	D5380	2/22/2006	4	B			35.70		2/24/2006	DMT
3-RPP110.57	3/28/2006	D5567	3/29/2006	8	B			27.90		3/31/2006	DMT
3-RPP110.57	4/19/2006	D5703	4/20/2006	116				56.70		4/26/2006	DMT
3-RPP110.57	5/9/2006	D5775	5/10/2006	22	B			43.70		5/15/2006	DMT
3-RPP110.57	6/21/2006	D6022	6/22/2006	82				41.90		6/26/2006	MAF

A: Value reported is the mean of two or more determinations.

B: Results based upon colony counts outside the acceptable range

U: Material was analyzed for, but not detected. Value stored is the limit of detection for the process in use.

Originally, fecal coliform enumerations were to be done; however, as of October 4, 2005, the client requested that fecal coliform enumerations no longer be analyzed and reported.

Table 5.65 Bacterial Enumeration for Rappahannock River at Station 3-RPP104.47.

Station ID	Date of Sample	Lab ID	Lab-In Date	E. coli cfu/100ml	Quality	Fecal Coliform cfu/100ml	Quality	Optical Brighteners /ppb	Comments	Lab-Out Date	Lab Personnel
3-RPP104.47	7/7/2005	D4526	7/8/2005	42		60	B	71.00		7/22/2005	DM
3-RPP104.47	9/6/2005	D4740	9/7/2005	22	B	70	B	43.20		9/9/2005	DMT
3-RPP104.47	10/18/2005	D4879	10/19/2005	256	A			40.70		10/24/2005	DMT
3-RPP104.47	11/1/2005	D4937	11/2/2005	28	B			75.70		11/7/2005	DMT
3-RPP104.47	12/12/2005	D5045	12/13/2005	388	A			63.10		12/16/2005	DMT
3-RPP104.47	2/8/2006	D5314	2/9/2006	46				51.00		2/14/2006	DMT
3-RPP104.47	3/8/2006	D5452	3/9/2006	6	B			50.60		3/13/2006	DMT
3-RPP104.47	4/5/2006	D5595	4/6/2006	6	B			41.80		4/7/2006	DMT
3-RPP104.47	5/3/2006	D5763	5/4/2006	70				40.10		5/9/2006	DMT
3-RPP104.47	6/20/2006	D5978	6/21/2006	2	B			48.90		6/26/2006	MAF
3-RPP104.47	8/9/06	D6230	8/10/06	2	B			66.3		8/11/06	MAF

A: Value reported is the mean of two or more determinations.

B: Results based upon colony counts outside the acceptable range

U: Material was analyzed for, but not detected. Value stored is the limit of detection for the process in use.

Originally, fecal coliform enumerations were to be done; however, as of October 4, 2005, the client requested that fecal coliform enumerations no longer be analyzed and reported.

Table 5.66 Bacterial Enumeration for Rappahannock River at Station 3-RPP080.19.

Station ID	Date of Sample	Lab ID	Lab-In Date	E. coli cfu/100ml	Quality	Fecal Coliform cfu/100ml	Quality	Optical Brighteners /ppb	Comments	Lab-Out Date	Lab Personnel
3-RPP080.19	7/7/2005	D4524	7/8/2005	6	B	190	B	57.50		7/22/2005	DM
3-RPP080.19	8/9/2005	D4642	8/10/2005	22	B	40	B	79.30		8/13/2005	DMT
3-RPP080.19	9/6/2005	D4741	9/7/2005	16	B	30	B	61.90		9/9/2005	DMT
3-RPP080.19	10/18/2005	D4873	10/19/2005	180	A			90.40		10/24/2005	DMT
3-RPP080.19	11/1/2005	D4935	11/2/2005	66				90.30		11/7/2005	DMT
3-RPP080.19	12/12/2005	D5042	12/13/2005	108				47.70		12/16/2005	DMT
3-RPP080.19	1/4/2006	D5122	1/5/2006	76				64.10		1/11/2006	DMT
3-RPP080.19	2/8/2006	D5312	2/9/2006	136	A			61.30		2/14/2006	DMT
3-RPP080.19	3/8/2006	D5450	3/9/2006	2	B			48.30		3/13/2006	DMT
3-RPP080.19	4/5/2006	D5593	4/6/2006	8	B			41.30		4/7/2006	DMT
3-RPP080.19	5/3/2006	D5761	5/4/2006	24	B			81.30		5/9/2006	DMT
3-RPP080.19	6/20/2006	D5976	6/21/2006	6	B			51.60		6/26/2006	MAF

A: Value reported is the mean of two or more determinations.

B: Results based upon colony counts outside the acceptable range

U: Material was analyzed for, but not detected. Value stored is the limit of detection for the process in use.

Originally, fecal coliform enumerations were to be done; however, as of October 4, 2005, the client requested that fecal coliform enumerations no longer be analyzed and reported.

Table 5.67 Bacterial Enumeration for Rappahannock River at Station 3-RPP091.55.

Station ID	Date of Sample	Lab ID	Lab-In Date	E. coli cfu/100ml	Quality	Fecal Coliform cfu/100ml	Quality	Optical Brighteners /ppb	Comments	Lab-Out Date	Lab Personnel
3-RPP091.55	7/7/2005	D4525	7/8/2005	10	B	120	B	66.70		7/22/2005	DM
3-RPP091.55	8/9/2005	D4643	8/10/2005	12	B	80	B	14.90		8/13/2005	DMT
3-RPP091.55	9/6/2005	D4742	9/7/2005	28	B	60	B	68.40		9/9/2005	DMT
3-RPP091.55	10/18/2005	D4876	10/19/2005	74				60.50		10/24/2005	DMT
3-RPP091.55	11/1/2005	D4936	11/2/2005	114				99.10		11/7/2005	DMT
3-RPP091.55	12/12/2005	D5044	12/13/2005	246	A			48.50		12/16/2005	DMT
3-RPP091.55	1/4/2006	D5123	1/5/2006	141	A			85.80		1/11/2006	DMT
3-RPP091.55	2/8/2006	D5313	2/9/2006	210	A			83.80		2/14/2006	DMT
3-RPP091.55	3/8/2006	D5451	3/9/2006	1	U			33.80		3/13/2006	DMT
3-RPP091.55	4/5/2006	D5594	4/6/2006	12	B			36.80		4/7/2006	DMT
3-RPP091.55	5/3/2006	D5762	5/4/2006	20	B			53.00		5/9/2006	DMT
3-RPP091.55	6/20/2006	D5977	6/21/2006	20	B			52.30		6/26/2006	MAF

A: Value reported is the mean of two or more determinations.

B: Results based upon colony counts outside the acceptable range

U: Material was analyzed for, but not detected. Value stored is the limit of detection for the process in use.

Originally, fecal coliform enumerations were to be done; however, as of October 4, 2005, the client requested that fecal coliform enumerations no longer be analyzed and reported.

Table 5.68 Bacterial Enumeration for Claiborne Run at Station 3-CLB000.50.

Station ID	Date of Sample	Lab ID	Lab-In Date	E. coli cfu/100ml	Quality	Fecal Coliform cfu/100ml	Quality	Optical Brighteners /ppb	Comments	Lab-Out Date	Lab Personnel
3-CLB000.50	7/20/2005	D4575	7/21/2005	279	A	1120	A	50.10		7/25/2005	DM
3-CLB000.50	8/24/2005	D4703	8/25/2005	114		350		52.80		8/29/2005	DMT
3-CLB000.50	9/27/2005	D4822	9/28/2005	142	A	390		47.80		9/30/2005	DMT
3-CLB000.50	10/26/2005	D4919	10/27/2005	300	A			80.50		10/28/2005	DMT
3-CLB000.50	11/29/2005	D5011	11/30/2005	90				57.70		12/2/2005	DMT
3-CLB000.50	1/24/2006	D5243	1/25/2006	66				71.50		1/27/2006	DMT
3-CLB000.50	2/21/2006	D5379	2/22/2006	12	B			41.10		2/24/2006	DMT
3-CLB000.50	3/28/2006	D5566	3/29/2006	34	B			38.60		3/31/2006	DMT
3-CLB000.50	4/19/2006	D5702	4/20/2006	94				59.30		4/26/2006	DMT
3-CLB000.50	5/9/2006	D5774	5/10/2006	128				64.6		5/15/2006	DMT
3-CLB000.50	6/21/2006	D6023	6/22/2006	400				56.5		6/26/2006	MAF
3-CLB000.50	7/25/2006	D6164	7/26/2006	250				62.7		7/28/2006	MAF

A: Value reported is the mean of two or more determinations.

B: Results based upon colony counts outside the acceptable range

U: Material was analyzed for, but not detected. Value stored is the limit of detection for the process in use.

Originally, fecal coliform enumerations were to be done; however, as of October 4, 2005, the client requested that fecal coliform enumerations no longer be analyzed and reported.

Table 5.69 Bacterial Enumeration for Hazel Run at Station 3-HAL000.57.

Station ID	Date of Sample	Lab ID	Lab-In Date	E. coli cfu/100ml	Quality	Fecal Coliform cfu/100ml	Quality	Optical Brighteners /ppb	Comments	Lab-Out Date	Lab Personnel
3-HAL000.57	7/20/2005	D4577	7/21/2005	940	L	400		48.80		7/25/2005	DM
3-HAL000.57	8/24/2005	D4705	8/25/2005	242	A	1750	A	61.70		8/29/2005	DMT
3-HAL000.57	9/27/2005	D4824	9/28/2005	212	A	1500	B	65.70		9/30/2005	DMT
3-HAL000.57	10/26/2005	D4917	10/27/2005	219	A			71.20		10/28/2005	DMT
3-HAL000.57	11/29/2005	D5009	11/30/2005	54				56.80		12/2/2005	DMT
3-HAL000.57	12/21/2005	D5105	12/22/2005	32	B			47.40		12/29/2005	DMT
3-HAL000.57	1/24/2006	D5241	1/25/2006	64				70.00		1/27/2006	DMT
3-HAL000.57	2/21/2006	D5378	2/22/2006	6	B			38.30		2/24/2006	DMT
3-HAL000.57	3/28/2006	D5564	3/29/2006	32	B			38.00		3/31/2006	DMT
3-HAL000.57	4/19/2006	D5701	4/20/2006	199	A			57.20		4/26/2006	DMT
3-HAL000.57	5/9/2006	D5772	5/10/2006	230				73.50		5/15/2006	DMT
3-HAL000.57	6/21/2006	D6025	6/22/2006	310				63.20		6/26/2006	MAF

A: Value reported is the mean of two or more determinations.

B: Results based upon colony counts outside the acceptable range

U: Material was analyzed for, but not detected. Value stored is the limit of detection for the process in use.

Originally, fecal coliform enumerations were to be done; however, as of October 4, 2005, the client requested that fecal coliform enumerations no longer be analyzed and reported.

Table 5.70 Bacterial Enumeration for Massaponax Creek at Station 3-MAP002.61.

Station ID	Date of Sample	Lab ID	Lab-In Date	E. coli cfu/100 ml	Quality	Fecal Coliform cfu/100ml	Quality	Optical Brighteners /ppb	Comments	Lab-Out Date	Lab Personnel
3-MAP002.61	7/20/2005	D4576	7/21/2005	880	L	1550	A	49.60		7/25/2005	DM
3-MAP002.61	8/24/2005	D4704	8/25/2005	58		300		92.70		8/29/2005	DMT
3-MAP002.61	9/27/2005	D4823	9/28/2005	24	B	70	B	75.90		9/30/2005	DMT
3-MAP002.61	10/26/2005	D4918	10/27/2005	236	A			72.60		10/28/2005	DMT
3-MAP002.61	11/29/2005	D5010	11/30/2005	4	B			55.90		12/2/2005	DMT
3-MAP002.61	12/21/2005	D5106	12/22/2005	4	B			48.40		12/29/2005	DMT
3-MAP002.61	1/24/2006	D5242	1/25/2006	254	A			75.90		1/27/2006	DMT
3-MAP002.61	2/21/2006	D5377	2/22/2006	2	B			40.60		2/24/2006	DMT
3-MAP002.61	3/28/2006	D5565	3/29/2006	12	B			47.80		3/31/2006	DMT
3-MAP002.61	4/19/2006	D5700	4/20/2006	84				79.60		4/26/2006	DMT
3-MAP002.61	5/9/2006	D5773	5/10/2006	1480				86.60		5/15/2006	DMT
3-MAP002.61	6/21/2006	D6024	6/22/2006	114				92.70		6/26/2006	MAF

A: Value reported is the mean of two or more determinations.

B: Results based upon colony counts outside the acceptable range

U: Material was analyzed for, but not detected. Value stored is the limit of detection for the process in use.

Originally, fecal coliform enumerations were to be done; however, as of October 4, 2005, the client requested that fecal coliform enumerations no longer be analyzed and reported.

Table 5.71 Bacterial Source Tracking for Neabsco Creek at Station 1ANEA002.89.

VADEQ ID	Date of Sample	Lab ID	HUP ID	Number of Isolates	E. coli (cfu/100 ml)	Wildlife	Human	Livestock	Pet
1ANEA002.89	7/20/05	D4578	A25	24	96	63%	0%	4%	33%
1ANEA002.89	8/24/05	D4706	A25	9	48	22%	0%	11%	67%
1ANEA002.89	9/27/05	D4825	A25	23	96	39%	9%	17%	35%
1ANEA002.89	10/26/05	D4921	A25	24	254	42%	4%	42%	12%
1ANEA002.89	11/29/05	D5013	A25	24	36	55%	33%	12%	0%
1ANEA002.89	12/21/05	D5103	A25	24	80	17%	25%	50%	8%
1ANEA002.89	1/24/06	D5245	A25	24	92	29%	0%	38%	33%
1ANEA002.89	2/21/06	D5381	A25	1	4	0%	0%	100%	0%
1ANEA002.89	3/28/06	D5568	A25	5	10	60%	0%	40%	0%
1ANEA002.89	4/19/06	D5704	A25	22	64	36%	5%	45%	14%
1ANEA002.89	5/9/06	D5776	A25	23	186	44%	9%	30%	17%
1ANEA002.89	6/21/06	D6026	A25	24	320	33%	4%	55%	8%

BOLD type indicates a statistically significant value.

*NVI - No Viable isolates

Table 5.72 Bacterial Source Tracking for Marsh Run at Station 3-MAH000.19.

VADEQ ID	Date of Sample	Lab ID	HUP ID	Number of Isolates	E. coli (cfu/100 ml)	Wildlife	Human	Livestock	Pet
3-MAH000.19	7/6/05	D4523	E08	24	72	12%	17%	38%	33%
3-MAH000.19	8/17/05	D4659	E08	24	50	21%	4%	4%	71%
3-MAH000.19	9/14/05	D4769	E08	10	12	10%	0%	0%	90%
3-MAH000.19	10/18/05	D4877	E08	9	22	22%	0%	11%	67%
3-MAH000.19	12/12/05	D5041	E08	24	14	25%	0%	25%	50%
3-MAH000.19	1/9/06	D5137	E08	24	287	8%	8%	21%	63%
3-MAH000.19	2/7/06	D5305	E08	24	157	8%	0%	0%	92%
3-MAH000.19	3/14/06	D5496	E08	24	78	17%	25%	17%	41%
3-MAH000.19	4/11/06	D5644	E08	24	56	33%	12%	4%	51%
3-MAH000.19	5/2/06	D5756	E08	13	98	39%	15%	31%	15%
3-MAH000.19	6/13/06	D5961	E08	24	74	38%	0%	8%	54%
3-MAH000.19	7/6/05	D4523	E08	24	56	12%	17%	38%	33%

BOLD type indicates a statistically significant value.

*NVI - No Viable isolates

Table 5.73 Bacterial Source Tracking for Browns Run at Station 3-BOS000.72.

VADEQ ID	Date of Sample	Lab ID	HUP ID	Number of Isolates	E. coli (cfu/100 ml)	Wildlife	Human	Livestock	Pet
3-BOS000.72	7/6/05	D4520	E08	24	82	42%	4%	25%	29%
3-BOS000.72	8/17/05	D4657	E08	24	125	17%	0%	29%	54%
3-BOS000.72	10/18/05	D4874	E08	24	308	25%	0%	17%	58%
3-BOS000.72	11/15/05	D4977	E08	24	44	21%	4%	33%	42%
3-BOS000.72	12/12/05	D5043	E08	24	348	25%	0%	4%	71%
3-BOS000.72	1/9/06	D5138	E08	24	74	25%	12%	29%	34%
3-BOS000.72	2/7/06	D5306	E08	24	80	12%	0%	12%	76%
3-BOS000.72	3/14/06	D5497	E08	24	132	1%	33%	33%	33%
3-BOS000.72	4/11/06	D5645	E08	24	104	42%	4%	4%	50%
3-BOS000.72	5/2/06	D5757	E08	24	330	29%	0%	50%	21%
3-BOS000.72	6/13/06	D5962	E08	24	700	4%	17%	17%	62%
3-BOS000.72	7/25/06	D6165	E08	12	20	0%	0%	33%	67%

BOLD type indicates a statistically significant value.

*NVI - No Viable isolates

Table 5.74 Bacterial Source Tracking for Craig Run at Station 3-CRA000.46.

VADEQ ID	Date of Sample	Lab ID	HUP ID	Number of Isolates	E. coli (cfu/100 ml)	Wildlife	Human	Livestock	Pet
3-CRA000.46	7/6/05	D4521	E08	24	243	25%	0%	63%	12%
3-CRA000.46	10/18/05	D4875	E08	24	54	8%	4%	8%	80%
3-CRA000.46	11/15/05	D4978	E08	7	20	29%	0%	57%	14%
3-CRA000.46	12/12/05	D5039	E08	24	630	21%	12%	38%	29%
3-CRA000.46	1/9/06	D5139	E08	24	76	12%	8%	4%	76%
3-CRA000.46	2/7/06	D5307	E08	23	48	4%	0%	53%	43%
3-CRA000.46	3/14/06	D5498	E08	24	68	4%	4%	54%	38%
3-CRA000.46	4/11/06	D5646	E08	18	26	44%	0%	28%	28%
3-CRA000.46	5/2/06	D5758	E08	7	24	29%	14%	0%	57%
3-CRA000.46	6/13/06	D5963	E08	24	510	12%	25%	46%	17%
3-CRA000.46	7/25/06	D6166	E08	24	310	25%	0%	12%	63%
3-CRA000.46	10/3/06	D6451	E08	16	34	44%	6%	6%	44%

BOLD type indicates a statistically significant value.

*NVI - No Viable isolates

Table 5.75 Bacterial Source Tracking for Rappahannock River at Station 3-RPP147.10.

VADEQ ID	Date of Sample	Lab ID	HUP ID	Number of Isolates	E. coli (cfu/100 ml)	Wildlife	Human	Livestock	Pet
3-RPP147.10	7/6/05	D4522	E08	24	220	4%	4%	42%	50%
3-RPP147.10	8/17/05	D4660	E08	24	84	38%	0%	8%	54%
3-RPP147.10	9/14/05	D4770	E08	24	100	12%	0%	0%	88%
3-RPP147.10	10/18/05	D4878	E08	24	74	8%	4%	25%	63%
3-RPP147.10	11/15/05	D4979	E08	24	60	4%	46%	33%	17%
3-RPP147.10	12/12/05	D5040	E08	24	163	21%	4%	17%	58%
3-RPP147.10	1/9/06	D5140	E08	24	60	8%	8%	38%	46%
3-RPP147.10	2/7/06	D5308	E08	12	30	33%	0%	25%	42%
3-RPP147.10	3/14/06	D5499	E08	24	56	12%	12%	38%	38%
3-RPP147.10	4/11/06	D5647	E08	24	42	17%	25%	12%	46%
3-RPP147.10	5/2/06	D5759	E08	23	94	13%	30%	13%	44%
3-RPP147.10	6/13/06	D5964	E08	24	42	0%	0%	100%	0%

BOLD type indicates a statistically significant value.

*NVI - No Viable isolates

Table 5.76 Bacterial Source Tracking for Cedar Run at Station 3-CED000.59.

VADEQ ID	Date of Sample	Lab ID	HUP ID	Number of Isolates	E. coli (cfu/100 ml)	Wildlife	Human	Livestock	Pet
3-CED000.59	7/12/05	D4533	E16	24	60	0%	12%	59%	29%
3-CED000.59	8/3/05	D4641	E16	24	36	21%	0%	8%	71%
3-CED000.59	9/7/05	D4744	E16	15	18	7%	0%	0%	93%
3-CED000.59	10/19/05	D4900	E16	13	34	0%	23%	15%	62%
3-CED000.59	11/16/05	D4995	E16	21	48	33%	38%	19%	10%
3-CED000.59	12/19/05	D5100	E16	24	210	21%	4%	29%	46%
3-CED000.59	1/10/06	D5147	E16	16	32	12%	38%	6%	44%
3-CED000.59	2/14/06	D5354	E16	13	28	31%	0%	31%	38%
3-CED000.59	3/22/06	D5536	E16	7	8	29%	0%	14%	57%
3-CED000.59	4/26/06	D5733	E16	24	134	0%	0%	8%	92%
3-CED000.59	5/31/06	D5894	E16	8	22	12%	12%	0%	76%
3-CED000.59	7/11/06	D6081	E16	24	88	45%	17%	17%	21%

BOLD type indicates a statistically significant value.

*NVI - No Viable isolates

Table 5.77 Bacterial Source Tracking for Rapidan River at Station 3-RAP006.53.

VADEQ ID	Date of Sample	Lab ID	HUP ID	Number of Isolates	E. coli (cfu/100 ml)	Wildlife	Human	Livestock	Pet
3-RAP006.53	7/12/05	D4532	E18	24	96	0%	0%	54%	46%
3-RAP006.53	8/3/05	D4640	E18	24	30	21%	0%	21%	58%
3-RAP006.53	9/7/05	D4743	E18	21	28	24%	0%	33%	43%
3-RAP006.53	10/19/05	D4899	E18	24	56	0%	12%	0%	88%
3-RAP006.53	11/16/05	D4994	E18	23	60	17%	31%	26%	26%
3-RAP006.53	12/19/05	D5101	E18	24	223	17%	0%	62%	21%
3-RAP006.53	1/10/06	D5146	E18	24	140	4%	33%	51%	12%
3-RAP006.53	2/14/06	D5353	E18	24	60	54%	0%	21%	25%
3-RAP006.53	3/22/06	D5535	E18	6	6	17%	0%	0%	83%
3-RAP006.53	4/26/06	D5732	E18	20	310	20%	10%	5%	65%
3-RAP006.53	5/31/06	D5893	E18	5	24	20%	0%	0%	80%
3-RAP006.53	7/11/06	D6080	E18	24	58	21%	4%	25%	50%

BOLD type indicates a statistically significant value.

*NVI - No Viable isolates

Table 5.78 Bacterial Source Tracking for Rappahannock River at Station 3-RPP110.57.

VADEQ ID	Date of Sample	Lab ID	HUP ID	Number of Isolates	E. coli (cfu/100 ml)	Wildlife	Human	Livestock	Pet
3-RPP110.57	7/20/05	D4574	E20	24	92	96%	0%	4%	0%
3-RPP110.57	8/24/05	D4702	E20	16	56	69%	19%	0%	12%
3-RPP110.57	9/27/05	D4821	E20	24	68	0%	8%	8%	84%
3-RPP110.57	10/26/05	D4920	E20	24	328	25%	42%	4%	29%
3-RPP110.57	11/29/05	D5012	E20	24	62	76%	12%	0%	12%
3-RPP110.57	12/21/05	D5104	E20	24	60	55%	12%	4%	29%
3-RPP110.57	1/24/06	D5244	E20	24	356	25%	21%	8%	46%
3-RPP110.57	2/21/06	D5380	E20	2	4	0%	100%	0%	0%
3-RPP110.57	3/28/06	D5567	E20	2	8	0%	0%	100%	0%
3-RPP110.57	4/19/06	D5703	E20	24	116	21%	21%	41%	17%
3-RPP110.57	5/9/06	D5775	E20	10	22	0%	30%	60%	10%
3-RPP110.57	6/21/06	D6022	E20	16	82	6%	12%	82%	0%

BOLD type indicates a statistically significant value.

*NVI - No Viable isolates

Table 5.79 Bacterial Source Tracking for Rappahannock River at Station 3-RPP104.47.

VADEQ ID	Date of Sample	Lab ID	HUP ID	Number of Isolates	E. coli (cfu/100 ml)	Wildlife	Human	Livestock	Pet
3-RPP104.47	7/7/05	D4526	E20	24	42	72%	12%	8%	8%
3-RPP104.47	9/6/05	D4740	E20	8	22	76%	0%	12%	12%
3-RPP104.47	10/18/05	D4879	E20	24	256	0%	4%	8%	88%
3-RPP104.47	11/1/05	D4937	E20	13	28	15%	15%	55%	15%
3-RPP104.47	12/12/05	D5045	E20	24	388	17%	21%	25%	37%
3-RPP104.47	2/8/06	D5314	E20	20	46	20%	35%	10%	35%
3-RPP104.47	3/8/06	D5452	E20	3	6	0%	67%	33%	0%
3-RPP104.47	4/5/06	D5595	E20	4	6	25%	0%	50%	25%
3-RPP104.47	5/3/06	D5763	E20	24	70	26%	33%	8%	33%
3-RPP104.47	6/20/06	D5978	E20	2	2	0%	50%	0%	50%
3-RPP104.47	8/9/06	D6230	E20	1	2	100%	0%	0%	0%

BOLD type indicates a statistically significant value.

*NVI - No Viable isolates

Table 5.80 Bacterial Source Tracking for Rappahannock River at Station 3-RPP080.19.

VAEQ ID	Date of Sample	Lab ID	HUP ID	Number of Isolates	E. coli (cfu/100 ml)	Wildlife	Human	Livestock	Pet
3-RPP080.19	7/7/05	D4524	E21	5	6	20%	40%	20%	20%
3-RPP080.19	8/9/05	D4642	E21	10	22	10%	0%	50%	40%
3-RPP080.19	9/6/05	D4741	E21	5	16	80%	0%	0%	20%
3-RPP080.19	10/18/05	D4873	E21	24	180	4%	0%	38%	58%
3-RPP080.19	11/1/05	D4935	E21	24	66	29%	0%	21%	50%
3-RPP080.19	12/12/05	D5042	E21	24	108	17%	25%	21%	37%
3-RPP080.19	1/4/06	D5122	E21	24	76	42%	17%	12%	29%
3-RPP080.19	2/8/06	D5312	E21	24	136	8%	71%	4%	17%
3-RPP080.19	3/8/06	D5450	E21	1	2	0%	100%	0%	0%
3-RPP080.19	4/5/06	D5593	E21	6	8	50%	0%	50%	0%
3-RPP080.19	5/3/06	D5761	E21	12	24	0%	67%	25%	8%
3-RPP080.19	6/20/06	D5976	E21	3	6	0%	67%	33%	0%

BOLD type indicates a statistically significant value.

*NVI - No Viable isolates

Table 5.81 Bacterial Source Tracking for Rappahannock River at Station 3-RPP091.55.

VAEQ ID	Date of Sample	Lab ID	HUP ID	Number of Isolates	E. coli (cfu/100 ml)	Wildlife	Human	Livestock	Pet
3-RPP091.55	7/7/2005	D4525	E21	7	10	43%	14%	29%	14%
3-RPP091.55	8/9/2005	D4643	E21	6	12	0%	17%	66%	17%
3-RPP091.55	9/6/2005	D4742	E21	13	28	54%	0%	31%	15%
3-RPP091.55	10/18/2005	D4876	E21	24	74	4%	8%	12%	76%
3-RPP091.55	11/1/2005	D4936	E21	24	114	46%	8%	17%	29%
3-RPP091.55	12/12/2005	D5044	E21	24	246	8%	17%	33%	42%
3-RPP091.55	1/4/2006	D5123	E21	23	141	26%	22%	30%	22%
3-RPP091.55	2/8/2006	D5313	E21	24	210	0%	45%	17%	38%
3-RPP091.55	3/8/2006	D5451	E21	*NVI	1	*NVI	*NVI	*NVI	*NVI
3-RPP091.55	4/5/2006	D5594	E21	6	12	67%	0%	33%	0%
3-RPP091.55	5/3/2006	D5762	E21	9	20	0%	67%	0%	33%
3-RPP091.55	6/20/2006	D5977	E21	4	20	0%	50%	50%	0%

BOLD type indicates a statistically significant value.

*NVI - No Viable isolates

Table 5.82 Bacterial Source Tracking for Claiborne Run at Station 3-CLB000.50.

VADEQ ID	Date of Sample	Lab ID	HUP ID	Number of Isolates	E. coli (cfu/100 ml)	Wildlife	Human	Livestock	Pet
3-CLB000.50	7/20/05	D4575	E20	24	279	76%	12%	12%	0%
3-CLB000.50	8/24/05	D4703	E20	24	114	83%	0%	17%	0%
3-CLB000.50	9/27/05	D4822	E20	24	142	0%	4%	17%	79%
3-CLB000.50	10/26/05	D4919	E20	24	300	4%	42%	0%	54%
3-CLB000.50	11/29/05	D5011	E20	24	90	71%	4%	17%	8%
3-CLB000.50	1/24/06	D5243	E20	24	66	21%	4%	67%	8%
3-CLB000.50	2/21/06	D5379	E20	5	12	20%	80%	0%	0%
3-CLB000.50	3/28/06	D5566	E20	19	34	52%	26%	11%	11%
3-CLB000.50	4/19/06	D5702	E20	24	94	29%	17%	17%	37%
3-CLB000.50	5/9/06	D5774	E20	23	128	22%	22%	22%	34%
3-CLB000.50	6/21/06	D6023	E20	24	400	8%	0%	84%	8%
3-CLB000.50	7/25/06	D6164	E20	24	250	33%	0%	67%	0%

BOLD type indicates a statistically significant value.

*NVI - No Viable isolates

Table 5.83 Bacterial Source Tracking for Hazel Run at Station 3-HAL000.57.

VADEQ ID	Date of Sample	Lab ID	HUP ID	Number of Isolates	E. coli (cfu/100 ml)	Wildlife	Human	Livestock	Pet
3-HAL000.57	7/20/05	D4577	E20	24	940	83%	0%	17%	0%
3-HAL000.57	8/24/05	D4705	E20	24	242	54%	0%	46%	0%
3-HAL000.57	9/27/05	D4824	E20	24	212	0%	0%	4%	96%
3-HAL000.57	10/26/05	D4917	E20	24	219	0%	12%	59%	29%
3-HAL000.57	11/29/05	D5009	E20	24	54	72%	4%	12%	12%
3-HAL000.57	12/21/05	D5105	E20	15	32	67%	0%	20%	13%
3-HAL000.57	1/24/06	D5241	E20	24	64	59%	4%	25%	12%
3-HAL000.57	2/21/06	D5378	E20	3	6	33%	67%	0%	0%
3-HAL000.57	3/28/06	D5564	E20	17	32	18%	18%	64%	0%
3-HAL000.57	4/19/06	D5701	E20	24	199	42%	21%	25%	12%
3-HAL000.57	5/9/06	D5772	E20	23	230	9%	9%	43%	39%
3-HAL000.57	6/21/06	D6025	E20	24	310	8%	8%	76%	8%

BOLD type indicates a statistically significant value.

*NVI - No Viable isolates

Table 5.84 Bacterial Source Tracking for Massaponax Creek at Station 3-MAP002.61.

VADEQ ID	Date of Sample	Lab ID	HUP ID	Number of Isolates	E. coli (cfu/100 ml)	Wildlife	Human	Livestock	Pet
3-MAP002.61	7/20/05	D4576	E20	24	880	75%	21%	4%	0%
3-MAP002.61	8/24/05	D4704	E20	21	58	76%	0%	19%	5%
3-MAP002.61	9/27/05	D4823	E20	11	24	0%	0%	9%	91%
3-MAP002.61	10/26/05	D4918	E20	24	236	0%	12%	63%	25%
3-MAP002.61	11/29/05	D5010	E20	4	4	50%	25%	25%	0%
3-MAP002.61	12/21/05	D5106	E20	3	4	67%	0%	33%	0%
3-MAP002.61	1/24/06	D5242	E20	24	254	21%	4%	63%	12%
3-MAP002.61	2/21/06	D5377	E20	2	2	0%	100%	0%	0%
3-MAP002.61	3/28/06	D5565	E20	6	12	33%	0%	67%	0%
3-MAP002.61	4/19/06	D5700	E20	24	84	80%	8%	12%	0%
3-MAP002.61	5/9/06	D5773	E20	22	1480	9%	18%	32%	41%
3-MAP002.61	6/21/06	D6024	E20	24	114	0%	0%	92%	8%

BOLD type indicates a statistically significant value.

*NVI - No Viable isolates

5.5 Results for Piedmont Region

The results of the water quality analyses for VADEQ's Piedmont Region (Figure 5.5) are reported in the following tables. Table 5.85 indicates the number of samples analyzed in the 2005-2006 sampling phase. Bacterial enumerations and optical brightener concentrations are reported in Tables 5.86 through 5.96. The results of the BST analysis are reported in Tables 5.97 through 5.107.

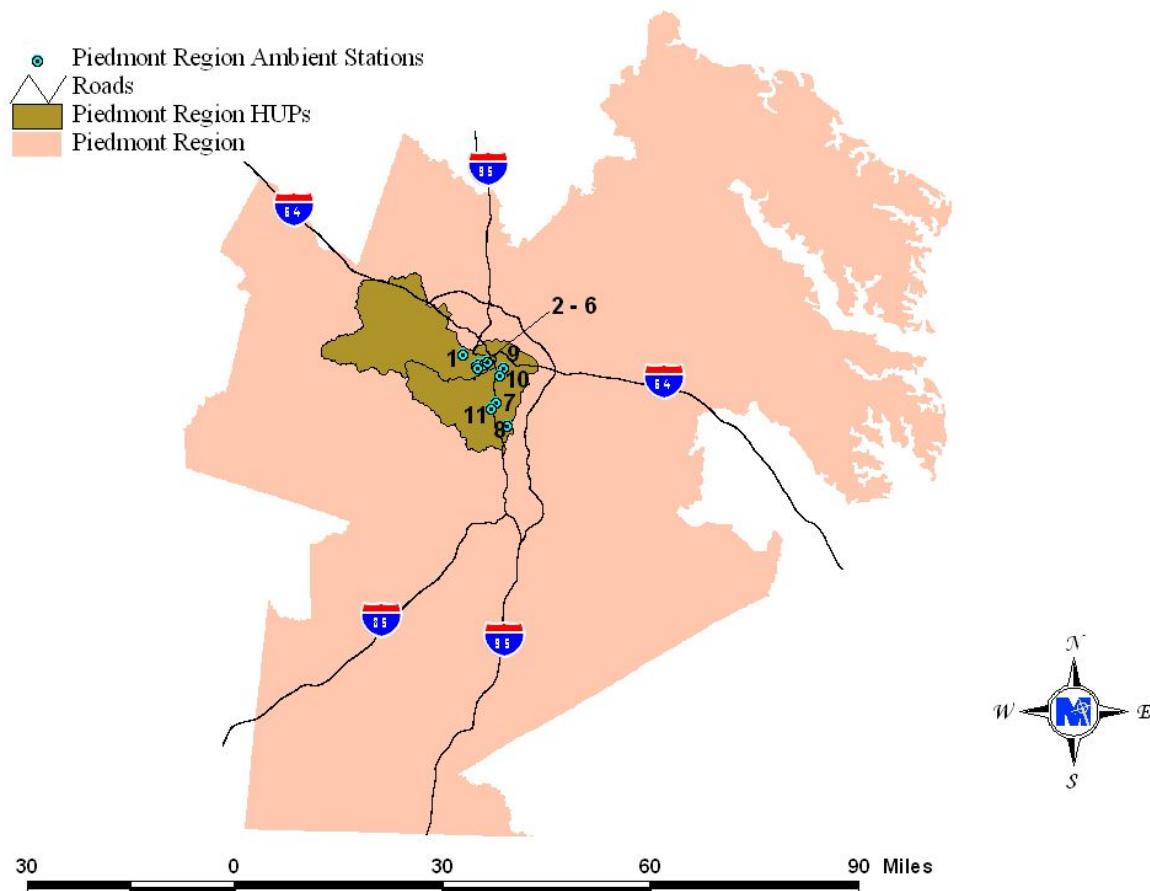


Figure 5.5 Bacterial sampling stations in VADEQ's Piedmont Region.

Table 5.85 Summary of bacterial sampling in VADEQ's Piedmont Region.

Station Number	Station ID	HUP	County / City	Stream Name	# of Samples Received	% Violations for <i>E. coli</i>
1	2-JMS115.29	H39	Richmond	James River	12	0%
2	2-JMS112.79	H39	Richmond	James River	12	0%
3	2-JMS112.33	H39	Richmond	James River	12	0%
4	2-JMS111.47	H39	Richmond	James River	12	0%
5	2-JMS111.17	H39	Richmond	James River	12	0%
6	2-RDD000.19	H39	Richmond	James River CSO	12	8%
7	2-JMS104.16	G01	Richmond	Tidal James River	12	17%
8	2-JMS099.30	G01	Chesterfield	Tidal James River	12	8%
9	2-GIL001.00	G01	Richmond	Gillies Creek	12	25%
10	2-ALM000.42	G01	Henrico	Almond Creek	12	8%
11	2-GOD000.77	G01	Richmond	Goode Creek	12	33%

Table 5.86 Bacterial Enumeration for James River at Station 2-JMS115.29.

Station ID	Date of Sample	Lab ID	Lab-In Date	E. coli cfu/100ml	Quality	Fecal Coliform cfu/100ml	Quality	Optical Brighteners /ppb	Comments	Lab-Out Date	Lab Personnel
2-JMS115.29	7/19/2005	D4561	7/20/2005	36	B	60	B	42.60		7/22/2005	DM
2-JMS115.29	8/23/2005	D4691	8/24/2005	18	B	100	B	48.40		8/26/2005	DMT
2-JMS115.29	9/20/2005	D4806	9/21/2005	62		160	B	34.90		9/23/2005	DMT
2-JMS115.29	10/18/2005	D4883	10/19/2005	30	B			48.90		10/24/2005	DMT
2-JMS115.29	11/15/2005	D4980	11/16/2005	1	U			59.00		11/18/2005	DMT
2-JMS115.29	12/13/2005	D5071	12/14/2005	100				50.90		12/16/2005	DMT
2-JMS115.29	1/10/2006	D5160	1/11/2006	6	B			38.70		1/17/2006	DMT
2-JMS115.29	2/14/2006	D5348	2/15/2006	10	B			37.20		2/20/2006	DMT
2-JMS115.29	3/14/2006	D5502	3/15/2006	6	B			35.20		3/18/2006	DMT
2-JMS115.29	4/3/2006	D5592	4/4/2006	6	B			34.40		4/6/2006	DMT
2-JMS115.29	5/10/2006	D5781	5/11/2006	12	B			45.4		5/15/2006	DMT
2-JMS115.29	6/7/2006	D5925	6/8/2006	44				72.8		6/12/2006	DMT

A: Value reported is the mean of two or more determinations.

B: Results based upon colony counts outside the acceptable range

U: Material was analyzed for, but not detected. Value stored is the limit of detection for the process in use.

Originally, fecal coliform enumerations were to be done; however, as of October 4, 2005, the client requested that fecal coliform enumerations no longer be analyzed and reported.

Table 5.87 Bacterial Enumeration for James River at Station 2-JMS112.79.

Station ID	Date of Sample	Lab ID	Lab-In Date	E. coli cfu/100ml	Quality	Fecal Coliform cfu/100ml	Quality	Optical Brighteners /ppb	Comments	Lab-Out Date	Lab Personnel
2-JMS112.79	7/19/2005	D4562	7/20/2005	98		160	B	51.40		7/22/2005	DM
2-JMS112.79	8/23/2005	D4692	8/24/2005	80		60	B	52.00		8/26/2005	DMT
2-JMS112.79	9/20/2005	D4807	9/21/2005	74		440		36.40		9/23/2005	DMT
2-JMS112.79	10/18/2005	D4884	10/19/2005	58				50.00		10/24/2005	DMT
2-JMS112.79	11/15/2005	D4981	11/16/2005	6	B			53.70		11/18/2005	DMT
2-JMS112.79	12/13/2005	D5072	12/14/2005	94				51.50		12/16/2005	DMT
2-JMS112.79	1/10/2006	D5161	1/11/2006	12	B			39.20		1/17/2006	DMT
2-JMS112.79	2/14/2006	D5349	2/15/2006	2	B			38.20		2/20/2006	DMT
2-JMS112.79	3/14/2006	D5503	3/15/2006	14	B			35.00		3/18/2006	DMT
2-JMS112.79	4/17/2006	D5663	4/18/2006	28	B			45.10		4/26/2006	DMT
2-JMS112.79	5/10/2006	D5780	5/11/2006	48				67.9		5/15/2006	DMT
2-JMS112.79	6/7/2006	D5926	6/8/2006	48				126.8		6/12/2006	DMT

A: Value reported is the mean of two or more determinations.

B: Results based upon colony counts outside the acceptable range

U: Material was analyzed for, but not detected. Value stored is the limit of detection for the process in use.

Originally, fecal coliform enumerations were to be done; however, as of October 4, 2005, the client requested that fecal coliform enumerations no longer be analyzed and reported.

Table 5.88 Bacterial Enumeration for James River at Station 2-JMS112.33.

Station ID	Date of Sample	Lab ID	Lab-In Date	E. coli cfu/100ml	Quality	Fecal Coliform cfu/100ml	Quality	Optical Brighteners /ppb	Comments	Lab-Out Date	Lab Personnel
2-JMS112.33	7/19/2005	D4560	7/20/2005	66		60	B	39.10		7/22/2005	DM
2-JMS112.33	8/23/2005	D4696	8/24/2005	32	B	150	B	54.50		8/26/2005	DMT
2-JMS112.33	9/20/2005	D4811	9/21/2005	40		70	B	33.20		9/23/2005	DMT
2-JMS112.33	10/18/2005	D4888	10/19/2005	40				51.30		10/21/2005	DMT
2-JMS112.33	11/15/2005	D4985	11/16/2005	24	B			54.70		11/18/2005	DMT
2-JMS112.33	12/13/2005	D5075	12/14/2005	90				52.00		12/16/2005	DMT
2-JMS112.33	1/10/2006	D5162	1/11/2006	6	B			50.90		1/17/2006	DMT
2-JMS112.33	2/14/2006	D5350	2/15/2006	14	B			63.00		2/20/2006	DMT
2-JMS112.33	3/14/2006	D5504	3/15/2006	8	B			41.90		3/18/2006	DMT
2-JMS112.33	4/17/2006	D5664	4/18/2006	48				58.30		4/26/2006	DMT
2-JMS112.33	5/10/2006	D5777	5/11/2006	68				52.2		5/15/2006	DMT
2-JMS112.33	6/7/2006	D5927	6/8/2006	36	B			67.4		6/12/2006	DMT

A: Value reported is the mean of two or more determinations.

B: Results based upon colony counts outside the acceptable range

U: Material was analyzed for, but not detected. Value stored is the limit of detection for the process in use.

Originally, fecal coliform enumerations were to be done; however, as of October 4, 2005, the client requested that fecal coliform enumerations no longer be analyzed and reported.

Table 5.89 Bacterial Enumeration for James River at Station 2-JMS111.47.

Station ID	Date of Sample	Lab ID	Lab-In Date	E. coli cfu/100ml	Quality	Fecal Coliform cfu/100ml	Quality	Optical Brighteners /ppb	Comments	Lab-Out Date	Lab Personnel
2-JMS111.47	7/19/2005	D4564	7/20/2005	130		280		48.40		7/22/2005	DM
2-JMS111.47	8/23/2005	D4695	8/24/2005	74		90	B	75.30		8/26/2005	DMT
2-JMS111.47	9/20/2005	D4810	9/21/2005	82		120	B	34.90		9/23/2005	DMT
2-JMS111.47	10/18/2005	D4887	10/19/2005	48				49.00		10/21/2005	DMT
2-JMS111.47	11/15/2005	D4984	11/16/2005	20	B			53.10		11/18/2005	DMT
2-JMS111.47	12/13/2005	D5074	12/14/2005	82				52.10		12/16/2005	DMT
2-JMS111.47	1/10/2006	D5163	1/11/2006	10	B			39.30		1/17/2006	DMT
2-JMS111.47	2/14/2006	D5351	2/15/2006	10	B			38.30		2/20/2006	DMT
2-JMS111.47	3/14/2006	D5505	3/15/2006	6	B			36.30		3/18/2006	DMT
2-JMS111.47	4/17/2006	D5665	4/18/2006	22	B			44.00		4/26/2006	DMT
2-JMS111.47	5/10/2006	D5779	5/11/2006	38	B			92.1		5/15/2006	DMT
2-JMS111.47	6/7/2006	D5928	6/8/2006	62				129.2		6/12/2006	DMT

A: Value reported is the mean of two or more determinations.

B: Results based upon colony counts outside the acceptable range

U: Material was analyzed for, but not detected. Value stored is the limit of detection for the process in use.

Originally, fecal coliform enumerations were to be done; however, as of October 4, 2005, the client requested that fecal coliform enumerations no longer be analyzed and reported.

Table 5.90 Bacterial Enumeration for James River at Station 2-JMS111.17.

Station ID	Date of Sample	Lab ID	Lab-In Date	E. coli cfu/100ml	Quality	Fecal Coliform cfu/100ml	Quality	Optical Brighteners /ppb	Comments	Lab-Out Date	Lab Personnel
2-JMS111.17	7/19/2005	D4568	7/20/2005	48		100	B	38.70		7/22/2005	DM
2-JMS111.17	8/23/2005	D4694	8/24/2005	60		30	B	56.10		8/26/2005	DMT
2-JMS111.17	9/20/2005	D4809	9/21/2005	207	A	220		35.30		9/23/2005	DMT
2-JMS111.17	10/18/2005	D4886	10/19/2005	52				52.30		10/21/2005	DMT
2-JMS111.17	11/15/2005	D4983	11/16/2005	26	B			54.30		11/18/2005	DMT
2-JMS111.17	12/13/2005	D5073	12/14/2005	147	A			64.20		12/16/2005	DMT
2-JMS111.17	1/10/2006	D5164	1/11/2006	18	B			42.30		1/17/2006	DMT
2-JMS111.17	2/14/2006	D5352	2/15/2006	2	B			39.50		2/20/2006	DMT
2-JMS111.17	3/14/2006	D5506	3/15/2006	24	B			36.40		3/18/2006	DMT
2-JMS111.17	4/17/2006	D5666	4/18/2006	14	B			50.20		4/26/2006	DMT
2-JMS111.17	5/10/2006	D5778	5/11/2006	60				54.6		5/15/2006	DMT
2-JMS111.17	6/7/2006	D5929	6/8/2006	180	B			82.7		6/12/2006	DMT

A: Value reported is the mean of two or more determinations.

B: Results based upon colony counts outside the acceptable range

U: Material was analyzed for, but not detected. Value stored is the limit of detection for the process in use.

Originally, fecal coliform enumerations were to be done; however, as of October 4, 2005, the client requested that fecal coliform enumerations no longer be analyzed and reported.

Table 5.91 Bacterial Enumeration for James River CSO at Station 2-RDD000.19.

Station ID	Date of Sample	Lab ID	Lab-In Date	E. coli cfu/100ml	Quality	Fecal Coliform cfu/100ml	Quality	Optical Brighteners /ppb	Comments	Lab-Out Date	Lab Personnel
2-RDD000.19	7/19/2005	D4563	7/20/2005	104		250		49.20		7/22/2005	DM
2-RDD000.19	8/23/2005	D4693	8/24/2005	70		180	B	117.00		8/26/2005	DMT
2-RDD000.19	9/20/2005	D4808	9/21/2005	104		210		71.20		9/23/2005	DMT
2-RDD000.19	10/18/2005	D4885	10/19/2005	100				67.30		10/21/2005	DMT
2-RDD000.19	11/15/2005	D4982	11/16/2005	44				76.20		11/18/2005	DMT
2-RDD000.19	12/14/2005	D5081	12/15/2005	32	B			80.00		12/19/2005	DMT
2-RDD000.19	1/10/2006	D5159	1/11/2006	28	B			85.10		1/17/2006	DMT
2-RDD000.19	2/14/2006	D5347	2/15/2006	151	A			107.50		2/20/2006	DMT
2-RDD000.19	3/14/2006	D5501	3/15/2006	66				76.60		3/18/2006	DMT
2-RDD000.19	4/17/2006	D5668	4/18/2006	38	B			125.50		4/26/2006	DMT
2-RDD000.19	5/10/2006	D5782	5/11/2006	140	B			126.3		5/15/2006	DMT
2-RDD000.19	6/7/2006	D5924	6/8/2006	320				150.7		6/12/2006	DMT

A: Value reported is the mean of two or more determinations.

B: Results based upon colony counts outside the acceptable range

U: Material was analyzed for, but not detected. Value stored is the limit of detection for the process in use.

Originally, fecal coliform enumerations were to be done; however, as of October 4, 2005, the client requested that fecal coliform enumerations no longer be analyzed and reported.

Table 5.92 Bacterial Enumeration for Tidal James River at Station 2-JMS104.16.

Station ID	Date of Sample	Lab ID	Lab-In Date	E. coli cfu/100ml	Quality	Fecal Coliform cfu/100ml	Quality	Optical Brighteners /ppb	Comments	Lab-Out Date	Lab Personnel
2-JMS104.16	7/19/2005	D4569	7/20/2005	60		260		31.20		7/22/2005	DM
2-JMS104.16	8/23/2005	D4701	8/24/2005	4	B	60	B	52.90		8/26/2005	DMT
2-JMS104.16	9/20/2005	D4816	9/21/2005	14	B	100	B	65.90		9/23/2005	DMT
2-JMS104.16	10/18/2005	D4893	10/19/2005	36	B			51.20		10/21/2005	DMT
2-JMS104.16	11/15/2005	D4990	11/16/2005	36	B			58.30		11/18/2005	DMT
2-JMS104.16	12/13/2005	D5080	12/14/2005	206	A			51.60		12/16/2005	DMT
2-JMS104.16	1/17/2006	D5194	1/18/2006	383	A			50.30		1/24/2006	DMT
2-JMS104.16	2/21/2006	D5384	2/22/2006	18	B			35.40		2/24/2006	DMT
2-JMS104.16	3/20/2006	D5530	3/21/2006	18	B			40.00		3/24/2006	DMT
2-JMS104.16	4/26/2006	D5731	4/27/2006	56				51.7		5/9/2006	DMT
2-JMS104.16	5/15/2006	D5794	5/16/2006	250				48.5		5/19/2006	DMT
2-JMS104.16	6/21/2006	D6033	6/22/2006	8	B			60.9		6/26/2006	MAF

A: Value reported is the mean of two or more determinations.

B: Results based upon colony counts outside the acceptable range

U: Material was analyzed for, but not detected. Value stored is the limit of detection for the process in use.

Originally, fecal coliform enumerations were to be done; however, as of October 4, 2005, the client requested that fecal coliform enumerations no longer be analyzed and reported.

Table 5.93 Bacterial Enumeration for Tidal James River at Station 2-JMS099.30.

Station ID	Date of Sample	Lab ID	Lab-In Date	E. coli cfu/100ml	Quality	Fecal Coliform cfu/100ml	Quality	Optical Brighteners /ppb	Comments	Lab-Out Date	Lab Personnel
2-JMS099.30	7/19/2005	D4570	7/20/2005	28	B	270		39.90		7/22/2005	DM
2-JMS099.30	8/23/2005	D4700	8/24/2005	16	B	1	U	53.60		8/26/2005	DMT
2-JMS099.30	9/20/2005	D4815	9/21/2005	2	B	240		43.00		9/23/2005	DMT
2-JMS099.30	10/18/2005	D4892	10/19/2005	34	B			67.30		10/21/2005	DMT
2-JMS099.30	11/15/2005	D4989	11/16/2005	22	B			60.50		11/18/2005	DMT
2-JMS099.30	12/13/2005	D5079	12/14/2005	198	A			55.80		12/16/2005	DMT
2-JMS099.30	1/17/2006	D5193	1/18/2006	359	A			48.10		1/24/2006	DMT
2-JMS099.30	2/21/2006	D5383	2/22/2006	4	B			36.20		2/24/2006	DMT
2-JMS099.30	3/20/2006	D5529	3/21/2006	12	B			79.50		3/24/2006	DMT
2-JMS099.30	4/26/2006	D5730	4/27/2006	24	B			49.3		5/9/2006	DMT
2-JMS099.30	5/15/2006	D5793	5/16/2006	28	B			49.5		5/19/2006	DMT
2-JMS099.30	6/21/2006	D6034	6/22/2006	18	B			95.9		6/26/2006	MAF

A: Value reported is the mean of two or more determinations.

B: Results based upon colony counts outside the acceptable range

U: Material was analyzed for, but not detected. Value stored is the limit of detection for the process in use.

Originally, fecal coliform enumerations were to be done; however, as of October 4, 2005, the client requested that fecal coliform enumerations no longer be analyzed and reported.

Table 5.94 Bacterial Enumeration for Gillies Creek at Station 2-GIL001.00.

Station ID	Date of Sample	Lab ID	Lab-In Date	E. coli cfu/100ml	Quality	Fecal Coliform cfu/100ml	Quality	Optical Brighteners /ppb	Comments	Lab-Out Date	Lab Personnel
2-GIL001.00	7/19/2005	D4566	7/20/2005	14	B	320		42.10		7/27/2005	DMT
2-GIL001.00	8/23/2005	D4698	8/24/2005	800		2415	A	105.00		8/26/2005	DMT
2-GIL001.00	9/20/2005	D4813	9/21/2005	46		230		50.20		9/23/2005	DMT
2-GIL001.00	10/18/2005	D4890	10/19/2005	26	B			47.10		10/21/2005	DMT
2-GIL001.00	11/15/2005	D4987	11/16/2005	2	B			76.40		11/18/2005	DMT
2-GIL001.00	12/13/2005	D5077	12/14/2005	118	L			68.30		12/16/2005	DMT
2-GIL001.00	1/10/2006	D5155	1/11/2006	879				67.30		1/17/2006	DMT
2-GIL001.00	2/8/2006	D5309	2/9/2006	12	B			67.90		2/14/2006	DMT
2-GIL001.00	3/29/2006	D5577	3/30/2006	16	B			51.90		4/3/2006	DMT
2-GIL001.00	4/25/2006	D5728	4/26/2006	66				75.50		4/27/2006	DMT
2-GIL001.00	5/16/2006	D5806	5/17/2006	330				96.8		5/19/2006	DMT
2-GIL001.00	6/7/2006	D5920	6/8/2006	158				54.4		6/12/2006	DMT

A: Value reported is the mean of two or more determinations.

B: Results based upon colony counts outside the acceptable range

U: Material was analyzed for, but not detected. Value stored is the limit of detection for the process in use.

Originally, fecal coliform enumerations were to be done; however, as of October 4, 2005, the client requested that fecal coliform enumerations no longer be analyzed and reported.

Table 5.95 Bacterial Enumeration for Almond Creek at Station 2-ALM000.42.

Station ID	Date of Sample	Lab ID	Lab-In Date	E. coli cfu/100ml	Quality	Fecal Coliform cfu/100ml	Quality	Optical Brighteners /ppb	Comments	Lab-Out Date	Lab Personnel
2-ALM000.42	7/19/2005	D4567	7/20/2005	122		420		40.90		7/22/2005	DM
2-ALM000.42	8/23/2005	D4699	8/24/2005	199	A	1360	A	59.50		8/26/2005	DMT
2-ALM000.42	9/20/2005	D4814	9/21/2005	36	B	380		51.00		9/23/2005	DMT
2-ALM000.42	10/18/2005	D4891	10/19/2005	72				42.10		10/21/2005	DMT
2-ALM000.42	11/15/2005	D4988	11/16/2005	36	B			59.60		11/18/2005	DMT
2-ALM000.42	12/13/2005	D5078	12/14/2005	48				56.90		12/16/2005	DMT
2-ALM000.42	1/10/2006	D5156	1/11/2006	6	B			51.00		1/17/2006	DMT
2-ALM000.42	2/8/2006	D5310	2/9/2006	4	B			51.60		2/14/2006	DMT
2-ALM000.42	3/29/2006	D5578	3/30/2006	4	B			43.80		4/3/2006	DMT
2-ALM000.42	4/27/2006	D5736	4/28/2006	32	B			69.5		5/9/2006	DMT
2-ALM000.42	5/16/2006	D5807	5/17/2006	250				70.5		5/19/2006	DMT
2-ALM000.42	6/7/2006	D5921	6/8/2006	108				51.8		6/12/2006	DMT

A: Value reported is the mean of two or more determinations.

B: Results based upon colony counts outside the acceptable range

U: Material was analyzed for, but not detected. Value stored is the limit of detection for the process in use.

Originally, fecal coliform enumerations were to be done; however, as of October 4, 2005, the client requested that fecal coliform enumerations no longer be analyzed and reported.

Table 5.96 Bacterial Enumeration for Goode Creek at Station 2-GOD000.77.

Station ID	Date of Sample	Lab ID	Lab-In Date	E. coli cfu/100ml	Quality	Fecal Coliform cfu/100ml	Quality	Optical Brighteners /ppb	Comments	Lab-Out Date	Lab Personnel
2-GOD000.77	7/19/2005	D4565	7/20/2005	243	A	370		50.60		7/22/2005	DM
2-GOD000.77	8/23/2005	D4697	8/24/2005	161	A	230		82.50		8/26/2005	DMT
2-GOD000.77	9/20/2005	D4812	9/21/2005	147	A	240		55.00		9/23/2005	DMT
2-GOD000.77	10/18/2005	D4889	10/19/2005	333	A			27.40		10/21/2005	DMT
2-GOD000.77	11/15/2005	D4986	11/16/2005	50				72.00		11/18/2005	DMT
2-GOD000.77	12/13/2005	D5076	12/14/2005	12	B			63.80		12/16/2005	DMT
2-GOD000.77	1/10/2006	D5157	1/11/2006	8	B			59.80		1/17/2006	DMT
2-GOD000.77	2/8/2006	D5311	2/9/2006	0				67.40		2/14/2006	DMT
2-GOD000.77	3/29/2006	D5579	3/30/2006	6	B			62.00		4/3/2006	DMT
2-GOD000.77	4/27/2006	D5737	4/28/2006	80				90.0		5/9/2006	DMT
2-GOD000.77	5/16/2006	D5808	5/17/2006	730				120.3		5/19/2006	DMT
2-GOD000.77	6/7/2006	D5922	6/8/2006	1,220	B			94		6/12/2006	DMT

A: Value reported is the mean of two or more determinations.

B: Results based upon colony counts outside the acceptable range

U: Material was analyzed for, but not detected. Value stored is the limit of detection for the process in use.

Originally, fecal coliform enumerations were to be done; however, as of October 4, 2005, the client requested that fecal coliform enumerations no longer be analyzed and reported.

Table 5.97 Bacterial Source Tracking for James River at Station 2-JMS115.29

VADEQ ID	Date of Sample	Lab ID	HUP ID	Number of Isolates	E. coli (cfu/100 ml)	Wildlife	Human	Livestock	Pet
2-JMS115.29	7/19/05	D4561	H39	19	36	32%	21%	5%	42%
2-JMS115.29	8/23/05	D4691	H39	9	18	11%	67%	22%	0%
2-JMS115.29	9/20/05	D4806	H39	24	62	17%	46%	4%	33%
2-JMS115.29	10/18/05	D4883	H39	16	30	0%	38%	50%	12%
2-JMS115.29	11/15/05	D4980	H39	*NVI	1	*NVI	*NVI	*NVI	*NVI
2-JMS115.29	12/13/05	D5071	H39	24	100	12%	22%	33%	33%
2-JMS115.29	1/10/06	D5160	H39	2	6	0%	50%	0%	50%
2-JMS115.29	2/14/06	D5348	H39	6	10	34%	0%	33%	33%
2-JMS115.29	3/14/06	D5502	H39	3	6	67%	0%	0%	33%
2-JMS115.29	4/3/06	D5592	H39	4	6	50%	0%	0%	50%
2-JMS115.29	5/10/06	D5781	H39	6	12	0%	83%	17%	0%
2-JMS115.29	6/7/06	D5925	H39	24	44	0%	4%	38%	58%

BOLD type indicates a statistically significant value.

*NVI No Viable isolates.

Table 5.98 Bacterial Source Tracking for James River at Station 2-JMS112.79.

VADEQ ID	Date of Sample	Lab ID	HUP ID	Number of Isolates	E. coli (cfu/100 ml)	Wildlife	Human	Livestock	Pet
2-JMS112.79	7/19/05	D4562	H39	24	98	54%	17%	4%	25%
2-JMS112.79	8/23/05	D4692	H39	24	80	21%	63%	8%	8%
2-JMS112.79	9/20/05	D4807	H39	24	74	4%	54%	0%	42%
2-JMS112.79	10/18/05	D4884	H39	14	58	0%	79%	7%	14%
2-JMS112.79	11/15/05	D4981	H39	3	6	33%	0%	67%	0%
2-JMS112.79	12/13/05	D5072	H39	24	94	8%	12%	80%	0%
2-JMS112.79	1/10/06	D5161	H39	6	12	0%	0%	0%	100%
2-JMS112.79	2/14/06	D5349	H39	1	2	0%	100%	0%	0%
2-JMS112.79	3/14/06	D5503	H39	11	14	55%	0%	18%	27%
2-JMS112.79	4/17/06	D5663	H39	14	28	43%	14%	36%	7%
2-JMS112.79	5/10/06	D5780	H39	21	48	14%	72%	14%	0%
2-JMS112.79	6/7/06	D5926	H39	22	48	9%	32%	23%	36%

BOLD type indicates a statistically significant value.

*NVI - No Viable isolates

Table 5.99 Bacterial Source Tracking for James River at Station 2-JMS112.33.

VADEQ ID	Date of Sample	Lab ID	HUP ID	Number of Isolates	E. coli (cfu/100 ml)	Wildlife	Human	Livestock	Pet
2-JMS112.33	7/19/05	D4560	H39	24	66	46%	17%	8%	29%
2-JMS112.33	8/23/05	D4696	H39	16	32	6%	12%	70%	12%
2-JMS112.33	9/20/05	D4811	H39	16	40	31%	6%	6%	57%
2-JMS112.33	10/18/05	D4888	H39	17	40	34%	24%	24%	18%
2-JMS112.33	11/15/05	D4985	H39	13	24	70%	0%	15%	15%
2-JMS112.33	12/13/05	D5075	H39	24	90	4%	8%	84%	4%
2-JMS112.33	1/10/06	D5162	H39	3	6	0%	0%	67%	33%
2-JMS112.33	2/14/06	D5350	H39	5	14	60%	0%	40%	0%
2-JMS112.33	3/14/06	D5504	H39	6	8	50%	0%	17%	33%
2-JMS112.33	4/17/06	D5664	H39	18	48	72%	28%	0%	0%
2-JMS112.33	5/10/06	D5777	H39	24	68	33%	59%	4%	4%
2-JMS112.33	6/7/06	D5927	H39	23	36	39%	35%	22%	4%

BOLD type indicates a statistically significant value.

*NVI - No Viable isolates

Table 5.100 Bacterial Source Tracking for James River at Station 2-JMS111.47.

VADEQ ID	Date of Sample	Lab ID	HUP ID	Number of Isolates	E. coli (cfu/100 ml)	Wildlife	Human	Livestock	Pet
2-JMS111.47	7/19/05	D4564	H39	24	130	92%	8%	0%	0%
2-JMS111.47	8/23/05	D4695	H39	23	74	4%	0%	96%	0%
2-JMS111.47	9/20/05	D4810	H39	24	82	24%	0%	38%	38%
2-JMS111.47	10/18/05	D4887	H39	24	48	21%	63%	8%	8%
2-JMS111.47	11/15/05	D4984	H39	12	20	58%	17%	8%	17%
2-JMS111.47	12/13/05	D5074	H39	24	82	8%	12%	76%	4%
2-JMS111.47	1/10/06	D5163	H39	1	10	0%	0%	100%	0%
2-JMS111.47	2/14/06	D5351	H39	1	10	0%	100%	0%	0%
2-JMS111.47	3/14/06	D5505	H39	4	6	50%	0%	0%	50%
2-JMS111.47	4/17/06	D5665	H39	8	22	12%	12%	12%	64%
2-JMS111.47	5/10/06	D5779	H39	16	38	6%	63%	25%	6%
2-JMS111.47	6/7/06	D5928	H39	22	62	23%	18%	45%	14%

BOLD type indicates a statistically significant value.

*NVI - No Viable isolates

Table 5.101 Bacterial Source Tracking for James River at Station 2-JMS111.17.

VADEQ ID	Date of Sample	Lab ID	HUP ID	Number of Isolates	E. coli (cfu/100 ml)	Wildlife	Human	Livestock	Pet
2-JMS111.17	7/19/05	D4568	H39	24	48	76%	12%	8%	4%
2-JMS111.17	8/23/05	D4694	H39	23	60	13%	39%	13%	35%
2-JMS111.17	9/20/05	D4809	H39	24	207	25%	4%	33%	38%
2-JMS111.17	10/18/05	D4886	H39	17	52	58%	18%	6%	18%
2-JMS111.17	11/15/05	D4983	H39	10	26	50%	10%	10%	30%
2-JMS111.17	12/13/05	D5073	H39	23	147	13%	9%	65%	13%
2-JMS111.17	1/10/06	D5164	H39	5	18	0%	40%	20%	40%
2-JMS111.17	2/14/06	D5352	H39	*NVI	2	*NVI	*NVI	*NVI	*NVI
2-JMS111.17	3/14/06	D5506	H39	14	24	72%	7%	7%	14%
2-JMS111.17	4/17/06	D5666	H39	11	14	0%	36%	0%	64%
2-JMS111.17	5/10/06	D5778	H39	23	60	26%	70%	4%	0%
2-JMS111.17	6/7/06	D5929	H39	19	180	32%	11%	57%	0%

BOLD type indicates a statistically significant value.

*NVI - No Viable isolates

Table 5.102 Bacterial Source Tracking for James River CSO at Station 2-RDD000.19.

VADEQ ID	Date of Sample	Lab ID	HUP ID	Number of Isolates	E. coli (cfu/100 ml)	Wildlife	Human	Livestock	Pet
2-RDD000.19	7/19/05	D4563	H39	24	104	51%	12%	8%	29%
2-RDD000.19	8/23/05	D4693	H39	14	70	58%	14%	14%	14%
2-RDD000.19	9/20/05	D4808	H39	24	104	17%	37%	17%	29%
2-RDD000.19	10/18/05	D4885	H39	24	100	8%	29%	12%	51%
2-RDD000.19	11/15/05	D4982	H39	17	44	53%	0%	0%	47%
2-RDD000.19	12/14/05	D5081	H39	12	32	8%	42%	50%	0%
2-RDD000.19	1/10/06	D5159	H39	17	28	42%	29%	0%	29%
2-RDD000.19	2/14/06	D5347	H39	24	151	33%	21%	42%	4%
2-RDD000.19	3/14/06	D5501	H39	17	66	58%	6%	12%	24%
2-RDD000.19	4/17/06	D5668	H39	15	38	60%	13%	7%	20%
2-RDD000.19	5/10/06	D5782	H39	24	140	33%	55%	4%	8%
2-RDD000.19	6/7/06	D5924	H39	24	320	8%	33%	51%	8%

BOLD type indicates a statistically significant value.

*NVI - No Viable isolates

Table 5.103 Bacterial Source Tracking for Tidal James River at Station 2-JMS104.16.

VADEQ ID	Date of Sample	Lab ID	HUP ID	Number of Isolates	E. coli (cfu/100 ml)	Wildlife	Human	Livestock	Pet
2-JMS104.16	7/19/05	D4569	G01	24	60	63%	17%	12%	8%
2-JMS104.16	8/23/05	D4701	G01	3	4	67%	0%	33%	0%
2-JMS104.16	9/20/05	D4816	G01	9	14	0%	100%	0%	0%
2-JMS104.16	10/18/05	D4893	G01	17	36	52%	18%	18%	12%
2-JMS104.16	11/15/05	D4990	G01	11	36	46%	18%	9%	27%
2-JMS104.16	12/13/05	D5080	G01	24	206	8%	0%	67%	25%
2-JMS104.16	1/17/06	D5194	G01	23	383	9%	4%	52%	35%
2-JMS104.16	2/21/06	D5384	G01	10	18	100%	0%	0%	0%
2-JMS104.16	3/20/06	D5530	G01	12	18	49%	17%	17%	17%
2-JMS104.16	4/26/06	D5731	G01	20	56	25%	40%	15%	20%
2-JMS104.16	5/15/06	D5794	G01	23	250	0%	57%	17%	26%
2-JMS104.16	6/21/06	D6033	G01	4	8	25%	75%	0%	0%

BOLD type indicates a statistically significant value.

*NVI - No Viable isolates

Table 5.104 Bacterial Source Tracking for Tidal James River at Station 2-JMS099.30.

VADEQ ID	Date of Sample	Lab ID	HUP ID	Number of Isolates	E. coli (cfu/100 ml)	Wildlife	Human	Livestock	Pet
2-JMS099.30	7/19/05	D4570	G01	16	28	82%	12%	6%	0%
2-JMS099.30	8/23/05	D4700	G01	5	16	60%	0%	40%	0%
2-JMS099.30	9/20/05	D4815	G01	3	2	0%	0%	100%	0%
2-JMS099.30	10/18/05	D4892	G01	15	34	46%	27%	27%	0%
2-JMS099.30	11/15/05	D4989	G01	13	22	31%	0%	46%	23%
2-JMS099.30	12/13/05	D5079	G01	24	198	0%	0%	92%	8%
2-JMS099.30	1/17/06	D5193	G01	22	359	14%	0%	54%	32%
2-JMS099.30	2/21/06	D5383	G01	3	4	33%	67%	0%	0%
2-JMS099.30	3/20/06	D5529	G01	5	12	20%	40%	40%	0%
2-JMS099.30	4/26/06	D5730	G01	9	24	11%	67%	0%	22%
2-JMS099.30	5/15/06	D5793	G01	9	28	0%	22%	0%	78%
2-JMS099.30	6/21/06	D6034	G01	10	18	20%	50%	20%	10%

BOLD type indicates a statistically significant value.

*NVI - No Viable isolates

Table 5.105 Bacterial Source Tracking for Gillies Creek at Station 2-GIL001.00.

VADEQ ID	Date of Sample	Lab ID	HUP ID	Number of Isolates	E. coli (cfu/100 ml)	Wildlife	Human	Livestock	Pet
2-GIL001.00	7/19/05	D4566	G01	18	14	6%	0%	17%	77%
2-GIL001.00	8/23/05	D4698	G01	22	800	14%	18%	54%	14%
2-GIL001.00	9/20/05	D4813	G01	22	46	0%	14%	9%	77%
2-GIL001.00	10/18/05	D4890	G01	13	26	38%	31%	8%	23%
2-GIL001.00	11/15/05	D4987	G01	1	2	0%	0%	100%	0%
2-GIL001.00	12/13/05	D5077	G01	24	118	0%	21%	58%	21%
2-GIL001.00	1/10/06	D5155	G01	24	879	4%	17%	29%	50%
2-GIL001.00	2/8/06	D5309	G01	22	12	14%	72%	9%	5%
2-GIL001.00	3/29/06	D5577	G01	7	16	71%	0%	29%	0%
2-GIL001.00	4/25/06	D5728	G01	20	66	30%	25%	20%	25%
2-GIL001.00	5/16/06	D5806	G01	24	330	42%	17%	33%	8%
2-GIL001.00	6/7/06	D5920	G01	24	158	33%	26%	8%	33%

BOLD type indicates a statistically significant value.

*NVI - No Viable isolates

Table 5.106 Bacterial Source Tracking for Almond Creek at Station 2-ALM000.42.

VADEQ ID	Date of Sample	Lab ID	HUP ID	Number of Isolates	E. coli (cfu/100 ml)	Wildlife	Human	Livestock	Pet
2-ALM000.42	7/19/05	D4567	G01	24	122	0%	0%	33%	67%
2-ALM000.42	8/23/05	D4699	G01	24	199	42%	12%	42%	4%
2-ALM000.42	9/20/05	D4814	G01	21	36	10%	5%	24%	61%
2-ALM000.42	10/18/05	D4891	G01	24	72	34%	25%	29%	12%
2-ALM000.42	11/15/05	D4988	G01	16	36	31%	0%	63%	6%
2-ALM000.42	12/13/05	D5078	G01	24	48	12%	25%	34%	29%
2-ALM000.42	1/10/06	D5156	G01	3	6	100%	0%	0%	0%
2-ALM000.42	2/8/06	D5310	G01	4	4	50%	50%	0%	0%
2-ALM000.42	3/29/06	D5578	G01	3	4	0%	33%	0%	67%
2-ALM000.42	4/27/06	D5736	G01	7	32	0%	86%	0%	14%
2-ALM000.42	5/16/06	D5807	G01	24	250	25%	21%	25%	29%
2-ALM000.42	6/7/06	D5921	G01	24	108	8%	51%	33%	8%

BOLD type indicates a statistically significant value.

*NVI - No Viable isolates

Table 5.107 Bacterial Source Tracking for Goode Creek at Station 2-GOD000.77.

VADEQ ID	Date of Sample	Lab ID	HUP ID	Number of Isolates	E. coli (cfu/100 ml)	Wildlife	Human	Livestock	Pet
2-GOD000.77	7/19/05	D4565	G01	24	243	63%	21%	4%	12%
2-GOD000.77	8/23/05	D4697	G01	22	161	5%	5%	90%	0%
2-GOD000.77	9/20/05	D4812	G01	24	147	8%	0%	21%	71%
2-GOD000.77	10/18/05	D4889	G01	24	333	0%	8%	46%	46%
2-GOD000.77	11/15/05	D4986	G01	21	50	14%	0%	86%	0%
2-GOD000.77	12/13/05	D5076	G01	6	12	0%	0%	67%	33%
2-GOD000.77	1/10/06	D5157	G01	4	8	25%	25%	25%	25%
2-GOD000.77	2/8/06	D5311	G01	*	0	*	*	*	*
2-GOD000.77	3/29/06	D5579	G01	3	6	67%	0%	0%	33%
2-GOD000.77	4/27/06	D5737	G01	20	80	15%	35%	10%	40%
2-GOD000.77	5/16/06	D5808	G01	24	730	8%	12%	51%	29%
2-GOD000.77	6/7/06	D5922	G01	24	1220	25%	46%	12%	17%

BOLD type indicates a statistically significant value.

*NVI - No Viable isolates

6. DISCUSSION

Results of the 2005-2006 VADEQ BST program have been presented in this report. The ARCCs achieved during the library development stage are acceptable and there does not appear to be a high level of over-fitting. Based on the sample size targeted in each sample (*i.e.*, 24 isolates), there is 90% confidence that the proportions measured in each sample are within 15% of the actual proportions in the sampled population (*i.e.*, all bacteria in the stream at the time of sampling). Because a fixed-frequency sampling scheme was used, samples are not biased toward a particular flow regime and can therefore be combined to estimate the actual proportions contributed by the different sources over the entire year with greater precision (*i.e.*, 90% confidence that the estimate is within 5% of the actual proportions). Additionally, the statistical analyses applied to determine a significant difference from zero give a good indication of presence and absence of each source in each sample. All of these data are valuable for use in improving public awareness of the problem, improving model calibration/validation, and providing a more equitable allocation of loads to source classes.

Since the presence of optical brighteners does not always coincide with the presence of human fecal bacteria. These two indicators should be interpreted together. The consistent presence of optical brighteners with little or no indication of human fecal bacteria indicates likely gray-water discharge(s). The consistent presence of human fecal bacterial without the presence of high optical brightener concentrations may indicate failing septic systems-since optical brighteners photo degrade-or straight pipes in an area where washing machines are not typically owned or operated during the typical sample times. The presence of both indicators typically signifies a leaking/overflowing sewer system or a high density of failing on-site systems where the failure is directly discharged to the stream without the need of a washoff event.

In spite of the high quality of the data collected, care should be taken in using these data. These data represent, at most, 12 instantaneous observations at each station and may not be representative of long-term conditions. The hydrologic conditions during this period may not reflect either average or critical conditions. Additionally, the dynamics of the bacterial community are not well understood, so care should be taken in extrapolating from the in-stream condition to activities in the watershed. As with any other monitoring program, the data should

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not be viewed in a vacuum. Local knowledge of the sources involved, historical water quality records, and the hydrologic conditions during sampling should all be considered in any interpretation of this data.

REFERENCES

- Hagedorn, C., S. L. Robinson, J. R. Filtz, S. M. Grubbs, T. A. Angier, and R. B. Reneau, Jr. 1999. Using antibiotic resistance patterns in the fecal streptococci to determine sources of fecal pollution in a rural Virginia watershed. *Appl. Environ. Microbiol.* 65:5522-5531.
- USEPA. 1999. Guidance for Water Quality-Based Decisions: The TMDL Process. <http://www.epa.gov/OWOW/tmdl/decisions/dec1c.html>

APPENDIX A

Bacterial Source Tracking Analyses Supplemental Report

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Table A.1 False-positive and correct classification rates for twelve BST libraries developed in support of VADEQ's Phase-IV BST Program.

Library	Wildlife	False-Positive Rates			Rate of Correct Classification			
		Human	Livestock	Pet	Wildlife	Human	Livestock	Pet
02080103	4.5%	6.5%	13.6%	7.2%	69.5%	84.5%	84.1%	66.7%
02070010	11.9%	5.9%	11.9%	7.1%	69.9%	83.9%	65.2%	70.5%
02080104	18.2%	5.0%	9.6%	7.7%	77.6%	78.9%	46.7%	75.0%
02080203	9.1%	5.3%	12.6%	5.8%	67.9%	74.6%	80.0%	78.9%
02080205	9.9%	5.5%	11.0%	9.2%	68.7%	83.8%	70.0%	70.4%
02080206	12.7%	6.8%	11.1%	8.9%	67.0%	82.8%	61.1%	70.6%
02080202	12.2%	10.7%	13.2%	7.3%	67.8%	73.0%	64.4%	64.7%
03010105	8.8%	12.4%	10.2%	13.2%	64.5%	72.7%	59.3%	68.8%
06010205	7.9%	9.0%	9.3%	8.5%	73.3%	85.5%	70.4%	66.8%
05050001	5.8%	3.3%	7.7%	6.7%	80.0%	78.8%	83.9%	86.9%

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Table A.2 Species sampled for 12 libraries developed in support of VADEQ's Phase-IV BST Program.

Source Category	Species	02080103	0207010	02080104	02080203	0280205	02080206	02080202	03010105	06010205	05050001
Human	Human	X	X	X	X	X	X	X	X	X	X
Livestock	Beef	X	X	X	X	X	X	X	X	X	X
	Dairy				X	X	X	X	X		X
	Mule										X
	Goat					X	X		X	X	X
	Horse	X	X	X	X	X	X	X		X	X
	Llama										X
	Poultry	X			X	X	X	X			
	Sheep	X				X					X
	Swine	X			X	X	X	X	X		
Pet	Cat	X	X		X	X	X	X	X	X	X
	Dog	X	X	X	X	X	X	X	X	X	X
Wildlife	Bear				X	X	X	X	X		
	Bobcat				X						
	Coyote										X
	Deer	X	X	X	X	X	X	X	X	X	X
	Duck				X						X
	Fox	X			X	X	X	X	X	X	
	Goose		X	X	X	X	X	X	X		X
	Groundhog										X
	Muskrat				X		X	X	X		
	Opossum	X	X	X				X		X	
	Otter				X	X	X	X	X		
	Pigeon										X
	Quail					X					
	Rabbit	X		X					X		X
	Raccoon	X	X	X	X	X	X	X	X	X	X
	Sea Gull										
	Skunk				X	X	X	X	X		
	Squirrel				X	X	X	X	X		
	Wild Turkey					X			X		